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QST

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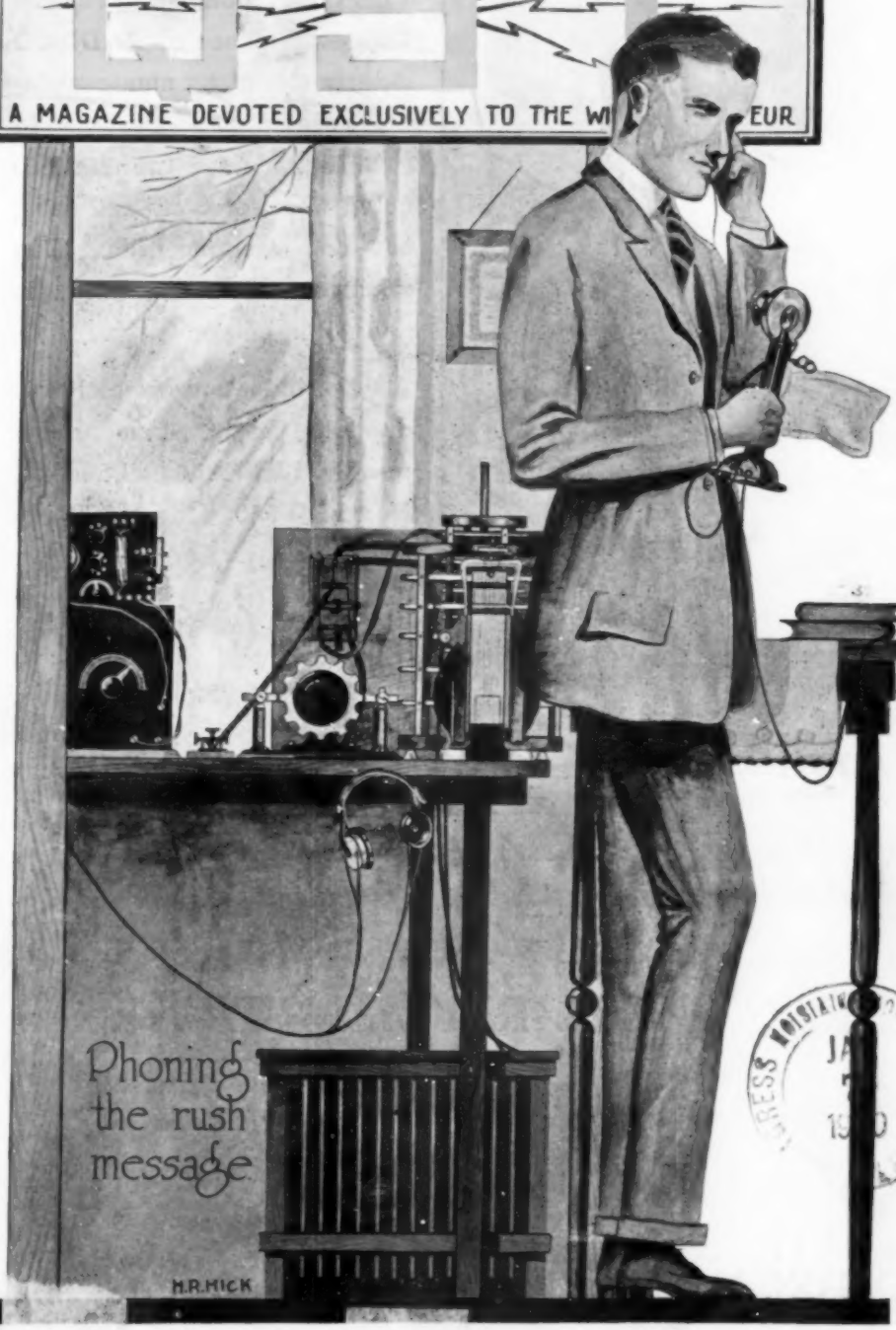

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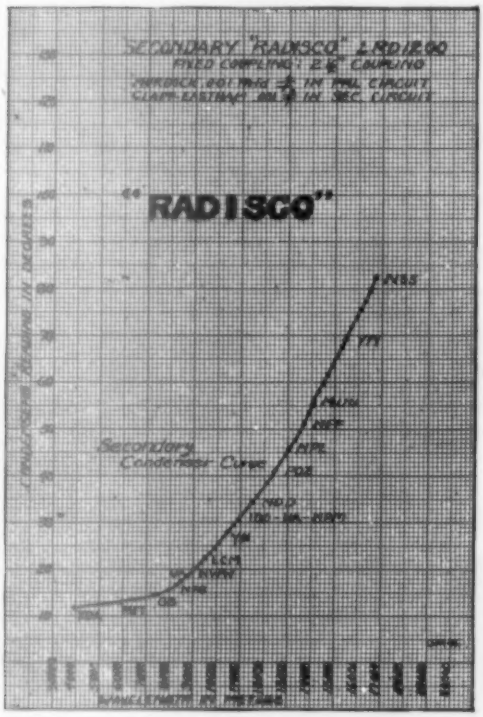

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A Magazine Devoted Exclusively to the Radio Amateur

Long Distance 200 Meter Work

By Dr. Radio

ONE of the significant things to one who is in contact with what is going on in the air these nights is the fact that while there must be at the present time several thousand amateurs transmitting on 200 meters or thereabouts, there are not to exceed fifty whose signals reach any considerable distance. Where one is heard 500 miles there are thousands who never are heard beyond 25 miles. When one has the opportunity to look into the matter the reasons for this condition are not difficult to find. It is usually based upon a lack of appreciation of some of the fundamentals of efficient transmitting and a surprising lack of thoroughness in installation. It is the object of this article to point out in a simple and non-mathematical way the importance of certain matters in long distance transmitting on 200 meters.

One of the surprising things is the lack of appreciation of condenser characteristics. It seems very difficult for many amateurs to resist the temptation to reason that if a small condenser is good a large one would be better. In several instances amateur stations have been found to be entirely out of resonance because of using a condenser whose large capacity gave the circuit a wavelength entirely beyond that of the antenna. This entirely apart from any consideration of the legal requirements as to wave length.

To such station owners as these it should be emphasized that a condenser which will oscillate at approximately 190 meters must of necessity be one of very small capacity. It only does harm to use a larger capacity.

The determination of what the size of a condenser for good work on 200 meters should be is not easy to define in non-mathematical language. The best way is probably to say that three jars of ordinary old style Marconi condensers gives the right capacity. To further assist in grasping this magnitude it may be said that a Marconi standard jar has approximately 172 square inches of copper plating on each side of the glass and that three of these jars give the right capacity. The thickness of the glass, which is a very important element, is about one sixteenth of an inch. The quality of the glass from a condenser standpoint is much better than that used in photographic plates, the amateur's usual source of supply for glass. These figures give a very good idea of the general magnitude of a proper condenser, and if the amateur will but make use of a wave meter he will quickly check his condenser and see whether or not it is very far from what is right for 200 meter work. If a condenser is to be purchased it can easily be obtained of the right capacity by stating in the order that one is wanted which will give a period of oscillation equal to 180 to 190 meters wave length, using one to two turns of primary inductance. With the inductance of the leads and also that of the usual primary turns of the oscillation transformer a wave of very close to 200 meters will be obtained, and, what is equally important, an opportunity for getting efficient resonance with the antenna circuit will be presented.

When it comes to this matter of resonance between condenser or closed circuit and the antenna, or open circuit, we encounter another frequent cause of poor performance of the amateur station. This is the over-long antenna. This trouble is bred from the same ambition to put in a big one while one is at it, as in the case of the condenser. If an antenna which is over 125 feet long is used, it amounts to prima facie evidence that a longer wave than 200 meters is being radiated except in very unusual cases. Of course where the condenser is large and the antenna is also large, resonance may be secured, but the wave length goes up and the amateur begins working on a wave beyond where his colleagues are generally listening. He

thus is generally not heard by them and he jumps to the conclusion that he is not radiating, makes changes and upsets his efficiency so that he is back again where he started. Again, and this is the most frequent condition, where an over size condenser is used it is very often in combination with a properly sized antenna, or where an over-sized antenna is used it is in combination with a properly sized condenser. It is only at rare intervals that both are found properly sized. Where they are, even then possibilities are sometimes ruined by inferior ground installation or inferior antenna and lead-in construction.

A properly proportioned antenna for 200 meters, as has been said, should not exceed 125 feet in total length from the far end to the actual point of contact with the ground system, in all ordinary cases. This length of wire will have a natural period of oscillation of approximately 180 to 190 meters provided there are no nearby metal objects to affect it, and provided it is of the usual inverted L or T or fan type. With three or four turns in the secondary of the oscillation transformer secondary it will oscillate at about 200 meters rate. Thus far we are in a position to secure resonance with it. But now enters the very important item of capacity. If this antenna has but a single wire its capacity in the sense of condensed capacity will be very low. It will take but a very small amount of energy to completely charge it, and no more energy can by any possibility be got into it. If, now, we make it of two wires with a spread equal to one fiftieth of its length we considerably increase its capacity, and we decrease its inductance. Its natural period will be but slightly slower. Adding wires has therefore helped because we have a system which will accept more energy. If we go on and make it of five wires or even nine we go on increasing the capacity and each time we increase the amount of charge it will take from the condenser. We get distance every time we add this energy. In order to carry this idea to its logical conclusion the well informed amateurs go up to 15, 17 and even 21 wires. In order to avoid getting a natural period which is above 180 or even 200 meters they shorten the wires a little, making them average approximately 100 feet long.

This increase in the number of wires introduces the matter of spread. Where the spread has to be of the order of three feet between wires it is seen that any such antenna system as 21 wires means that no ordinary spreader arrangement is possible. This brings about the use of a fan construction in which two masts are used with a supporting wire stretched between them and this wire holding the antenna wires. Then in order that every possible bit of wire may be located so as to figure as height, the station instruments are located on the ground between the masts. Where the latter are 100 feet high we have the very perfect arrangement of the antenna virtually beginning at the instruments and going straight up into the air. No waste occurs, to speak of. Being limited as to length by the necessity of keeping within 200 meters, and it being desirable to get up as high as possible, every foot of wire is devoted in the desired direction. From information at hand it can be said that several of the long distance amateurs which are heard every night have fan antenna running from 10 to 21 wires arranged either as described or else as near to this as the lay out of their house lots permit. Their long distance abilities are the result principally of carefully adjusted resonance and the large capacity of their antenna permitting their condensers to practically completely discharge at each impulse. A large energy value is thereby placed upon the antenna, which is what gives long distance.

An incidental advantage of this plurality of wires is the low resistance which follows. If each wire is run clear, or uninterrupted, straight to the instruments, there is very large and low resistance lead in, a thing of which too many amateurs do not appreciate the advantage. Only after a study of the effects of condenser discharge is one able to grasp the astonishing values of current that are flowing. While the current flows it goes into the hundreds of amperes. True it only flows a millionth of a second or so, but that does not alter the fact that while it does flow it positively must have an adequate conductor. It is of no avail to consider the AVERAGE current, for when no current at all is flowing no conductor at all is necessary. When the current is actually flowing is the sole consideration in determining proper magnitude of conductor. Again, since oscillating currents of the frequency of a 200 meter wave flow only on the surfaces of the conductor, the great importance of stranded wire antennae is apparent. An amateur using 200 meters cannot hope to have his signals carry 500 miles unless every bit of the small amount of energy which is in his condensers is got up into his antenna that is possible to put there.

Another very important element which is too often over-looked by the average amateur is the location of his capacity in his antenna. Systems with the far end lower than the near ends are very bad in this respect. The far end should be the highest, and the spread at the far end should be the greatest. Very perfect diagrams of these energy distribution

effects have been worked out and are available in all the better books on radio engineering.

One cannot pass from the antenna without reference to the ground system. No matter how perfect we may design and construct our condensers and antenna and lead-in and adjust for resonance, we cannot take advantage of them unless we have an appropriate ground system. The ground end is the end which has the highest current density, as is well known by most amateurs, while the far end is the end where the current density is the lowest, but the pressure or voltage the highest. Currents of amazing magnitudes have to be conveyed and distributed by even the smaller stations. These currents can but infrequently be conveyed to the actual earth and carried away, so to speak. Only where the ground is very wet for some considerable depth and of proper chemical characteristics is it possible to provide a low enough resistance to reach out into and secure an adaquate capacity. Thus it becomes necessary to provide capacity by means of good conducting metal, as copper. In every amateur station doing long distance work there will be found very elaborate connection to all manner of metal objects. Not only is the usual water pipe made use of but every other form of metallic system, such as heating systems, sewer connections, drainage pipes, and even hot air heating pipes. In addition to all these there is invariably an amount of copper wire buried which is equal to the wire in the antenna, and in addition to this as many ground rods as can be afforded or provided for. Some add copper mattresses made from very thin copper ribbon buried three to four feet between layers of powdered charcoal to hold the moisture and assist to repel corrosion. These systems average six feet by six feet and add considerably to capacity by virtue of their enormous surface. In general one can profit by giving full play to one's ambition to go it strong on ground system. It cannot possibly be overdone. The great defect in most amateur stations is that it is lamentably underdone.

There is one more very important element in long distance work which should be considered before closing. This is the matter of quenching at the rotary gap. A good station may destroy all its long distance possibilities at the studs of its rotary spark gap. It must be recognized that the antenna must be permitted to oscillate just as freely as possible. Nothing must be allowed to interpose which will dampen these oscillations. If they are damped the decrement is great, tuning is bad, and long distance is impossible. Any metal circuit in proximity to the antenna circuit will cause this damping. The nearest circuit, and it is a good one for absorbing energy, is the condenser circuit. When the gap sparks there is molten metal standing in vapor form between the stationary and the moving studs. A conducting circuit to the condensers is thus provided. If therefore, the spark is not quenched out immediately, the current flowing from antenna to ground and back through the secondary of the oscillation transformer will act back upon the primary of the oscillation transformer, and finding a good path through the metallic vapor at the gap will be led to the condensers which will absorb it the same as the current from the power transformer is absorbed.

To avoid this back action and the load that it imposes upon the antenna currents, it is necessary for the gap to open the closed circuit just as soon after the antenna has received its energy as possible. This means that the spark at the gap must be quenched out quickly. Various expedients have been adopted to do this, but few of them approach the quenched fixed gap of the usual 500 cycle commercial set. The best means is to make the moving member of the gap very large in diameter, very narrow when viewed circumferentially, though wide sidewise, and to run the gap at the very highest attainable speed. This gives an exceedingly short opposition to the studs and furthermore compressed air carried ahead of the fast moving studs helps to quench the spark by blowing away the metallic vapors. In a previous paper in this magazine the writer has pointed out the number of oscillations occuring in a 200 meter circuit per second and the number which there is time for in the ordinary amateur gap. No quenching worthy of the name occurs at all, and the absolute necessity for something better is made apparent. Gaps made by advanced amateurs are known where the numer of studs on the moving member is only two and the diameter as much as 18" and this is run at a speed as high as 7000 revolutions per minute. This invariably is accompanied by good quenching, and more consideration of this point should be given by those desiring to transmit over long distances.

In conclusion, and in connection with this point of rotary gaps, it is very obvious to any one who keeps in touch with the amateur transmitting going on every night, that it is the low note stations which are invariably the loudest and carry the longest distances. Some of the lowest notes are from gaps going the fastest. This makes it plain that these stations are giving their condensers the time necessary to charge up full from their power transformers and not attempting to imitate the high note of the 500 cycle commercial

(Concluded on page 17)

Masts

By S. Kruse

Q R. M. was just in to solicit aid in perpetrating a mast. He was in a hurry about it for this is a new sort of mast and must be erected before someone else copies the idea and takes the credit.

The mast is to be 50 feet high and of iron pipe. Pipe is heavy, so it is not well that 50 feet of it should fall on the roof of a neighbor who will be unreasonable. Now any sane person will see that the best way to keep a 50 foot iron pipe mast from blowing over is to reduce the area available for wind pressure. So he is making the mast entirely of one inch pipe and omitting guy wires, "except for three at the top to balance it."

I told him he was insane, told him so in three different ways. I was starting on a fourth way when he went out and closed the door behind himself firmly so that dishes fell off the pantry shelf.

But fellows, it was done in the days before the war. Out on Alabama Street one joyous nut had a mast of just that sort which was not only 50 but 60 feet high. I did not believe it, for it was a grotesque impossibility, perhaps even a deliberate lie. It is written that "a lie shall not live" yet this one lived thru all weathers for two years till an absent minded cow fell over one of the three guy wires.

We did a lot of impossible things in amateur radio before the war. To the present day few commercial or research men will believe that dozens of stations carried on communication over all sorts of distances up to a thousand miles and sometimes freaked a few hundred more—and did it with **one** audion at the receiving end. We that were in the game heard such miracles every evening and soon developed a fine ability to believe everything. Just to see if you retain that great faith I'll tell you of a few more masts—which existed. One lad bought a pair of twenty foot yellow pine two by twos and, after overlapping them about a foot, drove two twelve penny nails thru the joint. Then he stood the thing on the ridgepole next the chimney, guyed it to everything in sight, and hung a wierd seven wire antenna down toward the other end of the house. After that he had only to connect up the Thordarson and start to supply the neighborhood demand for socket explosions and meter burnouts. Later the rope broke and ran out of the pulley. He shinned up that 40 foot two by two and put in a new rope—I swear he did.

And there was another ham who wanted to have very few guy wires. He built a pair of great wooden frames forty feet tall, shaped like a capital letter A, and so heavy it took a chain hoist to erect them. Of course these eliminated side guys but at the last moment he had a flash of pure genius—he did away with **all** the guys by leaning the frames far apart at the top and letting the **antenna** hold them. This antenna not only had a flat top connecting the "A" frames but also leads from either end of the top to the radio shack under the center of the antenna so as to discourage the tiresome tendency for both frames to start going in the same direction whenever we were particularly busy.

There wasn't a guy wire on the job. One morning there was no radio shack either. None of us saw it happen but it looked as if the western A frame had come "over center" and fallen on the radio shack, driving the roof thru the floor. Along about the same time the eastern frame had gone on over and kicked the gable window of the family house into the hired girl's room. She got up at once, packed her belongings and went to the Missouri Pacific Railroad Station. She was perturbed about something of which she spoke extensively to Saint Patrick.

Of the forty thousand amateurs there was one whose mast was too tall. It was a wooden mast four inches square built in a way that was very popular in some regions. You started by setting up a twenty foot two by four scantling and then standing a ten foot one against it and spiking the two together with 20 penny nails which went clear thru and were clinched. Then you stood another 20 foot piece on the ten foot one and spiked it to the first 20 footer—again clinching the nails. So the mast grew, each side alternately being ten feet higher than the other till your cash ran out or dad got nervous about the altitude of the critter. Then you filled out with a final ten foot piece—clinching more nails—and came down, unless someone had forgotten to put steps on one of the scantlings before sending it up to you. In that case you stayed while the sun went down and the incredibly slow dubs below tried to find the missing steps by lantern light and nail them on the mast by the touch system. The particular chap I speak of was wealthier than most of us and had started the mast while his father was out of town, consequently he got up to 140 feet before clinching the final nail.

Just after that a real estate dealer

(Concluded on page 17)

*Wave Meter Construction and Operation**

By Louis Gerard Pacent †

IN TWO PARTS: PART II

To tune a transmitting set to a given wave length, say 200 meters, using this wave meter, one method would be to connect, as in Figure 1, a small flash light lamp in series with the wave meter inductance and capacity. Set the inductance parallel to and perhaps about ten inches away from the closed circuit of the transmitter, after having disconnected the antenna from the secondary of the oscillation transformer, as in Figure 13. Now hold down the transmitting key and vary the capacity of the wave meter until the lamp lights brightest. At first the lamp may not light at all in which case try tightening the coupling, that is, move the wave meter nearer to the closed circuit. Then again the resonance point may not

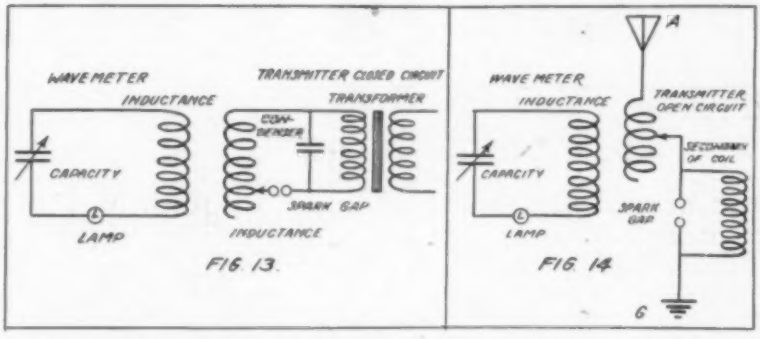


FIG. 13. FIG. 14.

be in the range of the coil used on the wave meter. Try the next largest coil. Care should be exercised not to get the coupling so close as to burn out the lamp due to excessive energy in the wave meter circuit. After the resonance point has been found read off from the wave meter curves the corresponding wave length. This may be above or below the desired 200 meters. Assume it to be 340 meters. To bring the wave length down reduce the number of turns of inductance. At least one turn should be used so as to make possible the efficient transfer of energy to the open circuit. But suppose using only one turn the wave length is still 250 meters, the condenser capacity must be reduced. This often can be conveniently accomplished by placing several condenser units in series.

Assuming a common case:—the condenser case of a one-half K.W. Clapp Eastham Hytone transmitter contains three units of .017 microfarads each but the external binding posts are so connected that only two of these units can be connected in series. The resulting capacity, 0.0089 microfarads, used in conjunction with one turn of inductance gives 260 meters. But by dissembling the box and reconnecting the units so that all three are in series the capacity, 0.006 microfarads, allows two turns to be used, giving a wave length of 200 meters. The two turns are enough to efficiently transfer the energy to the open circuit.

Now having adjusted the closed circuit to the desired wave length the open or antenna circuit is considered. If a hot wire ammeter is available connect it in the ground lead and having adjusted the oscillation transformer coils so as to be several inches apart vary the number of turns in the antenna circuit until the greatest deflection of the hot wire ammeter shows that the antenna current is a maximum. The circuits are now in resonance. In many amateur stations the secondary coil of the oscillation transformer is the only antenna circuit inductance. In tuning the station closely this is a disadvantage, especially when using a hot wire ammeter. The operator does not really know whether the variation of current is due to resonance or to change of coupling. Therefore it is best to provide a separate loading inductance if of only a few, perhaps four, turns with which to do the final tuning. After arriving at the point where maximum antenna current is obtained, the coupling should be loosened until the antenna current begins to fall markedly.

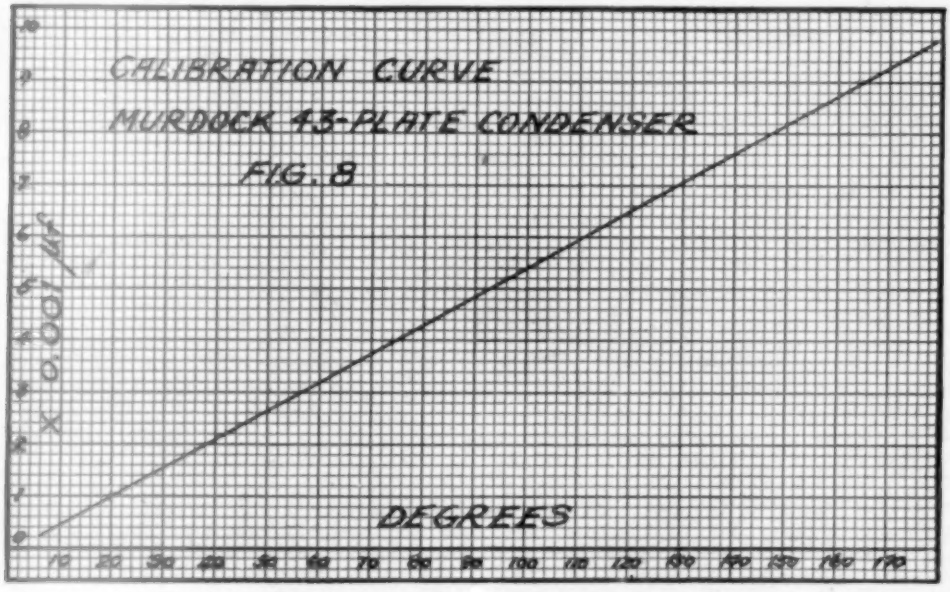
Next fix the coupling and with the key depressed, if the inductance of the wave meter is brought near the ground lead, though well away from the closed circuit, it will be found that the lamp will indicate

*Courtesy Radio Club of America

†President, Pacent Electric Co.

only one point of resonance, i.e., the 200 meter wave tuned for.

If a hot wire ammeter is not available the following method may be adopted to tune the open circuit to the closed oscillatory circuit. Insert the spark gap connected to a small induction coil or transformer in series with the antenna circuit as in Figure 14, with the antenna inductances, and arrange the wave meter so as to be in inductive relation to the antenna inductance. After loosening the coupling and disconnecting the closed circuit set the spark in operation, and measure the wave length. If this is longer than the wave length of the closed circuit the inductance of the antenna circuit should be decreased



or vice versa, it being adjusted until the same wave length is obtained as that to which the closed circuit is tuned. In case the fundamental wave length of the antenna is longer than the wave length on which it is desired to transmit it will be necessary to place a series condenser in the antenna circuit and readjust.

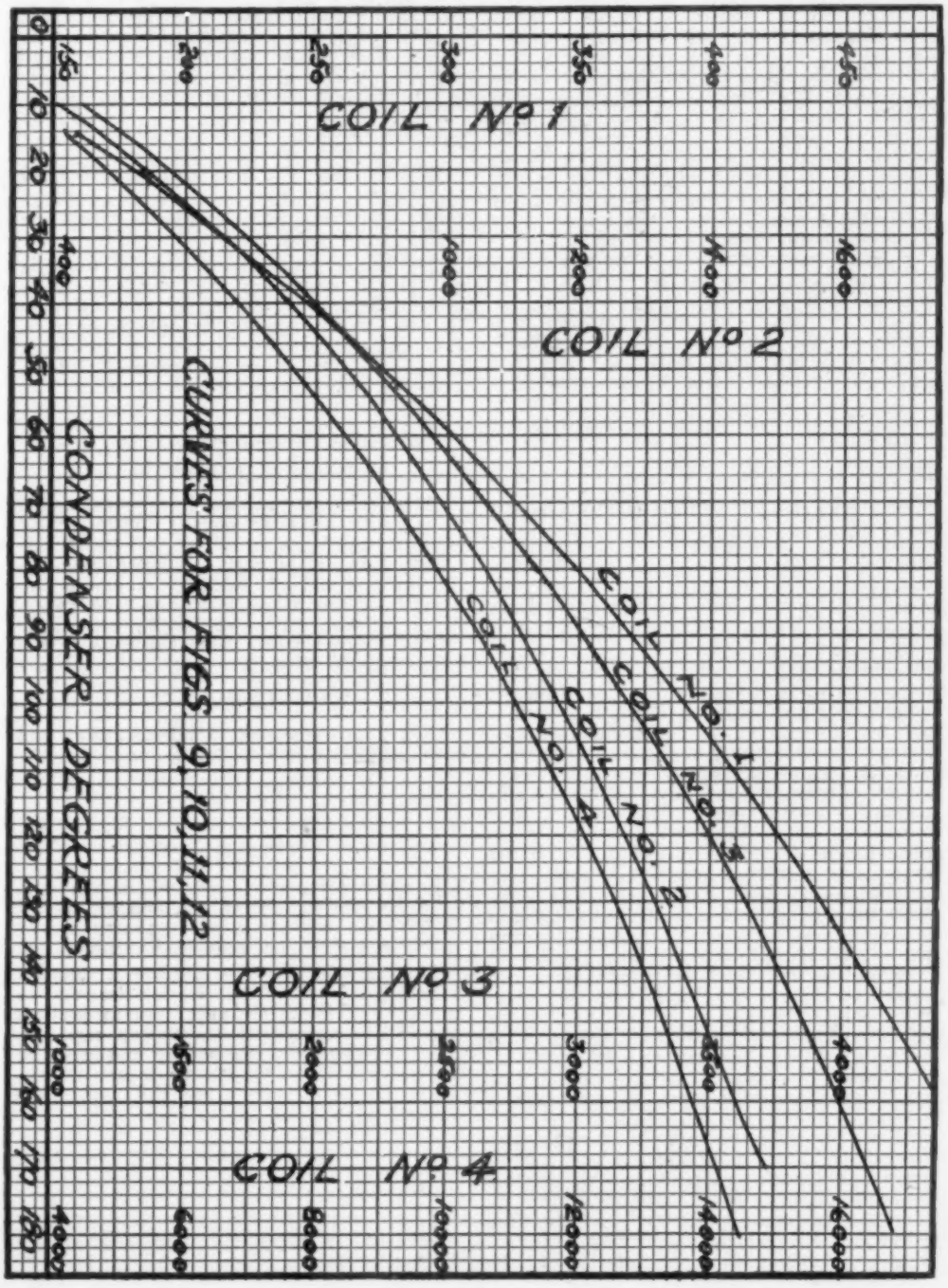
After obtaining the wave length desired, the spark gap and coil are removed, and the closed circuit, adjusted as previously described, is coupled or brought into inductive relation to the antenna inductance. Care should be taken not to make the coupling too close. If the oscillation transformer is made up of spirals allow several inches, if of helices allow at least an inch of coupling between active turns.

Now if the key of the transmitter is held down and the wave meter is placed near the ground lead well away from the closed circuit one point of resonance or one wave will be found. If two are found they are probably due to a too close coupling. If upon loosening the coupling one wave does not disappear the two circuits are not accurately tuned and should be retuned.

A third scheme sometimes used is to first tune the closed circuit to the desired wave length, then couple the open circuit in regular manner and insert an ordinary incandescent lamp in the ground lead. Now vary the inductance of the antenna circuit until maximum brilliancy of the lamp is obtained. In larger sets it may be necessary to loosen the coupling to prevent the lamp from being burned out. After the open circuit has been so adjusted as to obtain the greatest antenna current as indicated by lamp brilliancy, the lamp is removed from the open circuit and the coupling brought to normal. The wave meter is then brought near the ground lead and test made to be sure that there is but one wave.

With the loose coupling above recommended, a one-half K.W. set should give about .8 ampere in the antenna circuit and a one K.W. set should give about 2.0 amperes in the antenna circuit although in certain instances as much as 3.5 amperes have been obtained. This does not appear as satisfactory as the five amperes indicated by the hot wire ammeter at most stations but will do much better work for the following reason. With close coupling the antenna current of five amperes is radiated on several different wave lengths. Each

wave length receives only a portion of the energy indicated by the five amperes. Now a properly tuned receiving set absorbs only the energy at the wave length tuned to and therefore takes advantage of but part of the energy in the transmitting antenna. So aside from violating the law the station is not doing as well as if it were adjusted



to comply with the law. Thus even though the total radiated energy may be smaller for the new adjustment it is radiated on one wave length only.

Instead of using the small incandescent lamp in the procedure of tuning, a more convenient way may be to place an ordinary crystal detector in series with a pair of head telephones across the wave meter condenser as in Figure 3. The procedure is then practically the same as above. The point of resonance is indicated by the loudest sound in the receivers. The wave meter can be coupled with the transmitter circuits much more loosely as the detector is far more sensitive than the lamp. This sensitive arrangement also allows of detecting peaks (waves other than tuned for, i.e., coupling waves) which would not be indicated when using the lamp.

Several other indicating devices are shown in the diagrams but the milliammeter and hot wire wattmeter are not generally to be found in an amateur's equipment. Actually their use is very similar to that of the lamp and detector arrangements above described, but besides indicating resonance these meters make possible the plotting of resonance curves from which the resonant frequency can be more accurately determined. The decrement of the oscillations can also be calculated. Those who wish to learn how to use them are referred to Lieutenant Mauborgne's book entitled "Practical Uses of the Wave Meter in Wireless Telegraphy".

If desired the closed circuit of a receiving set may be calibrated thus enabling the operator to determine the wave length of any received signals. First, the secondary coil should be moved a moderate distance away from the primary (to that position which ordinarily gives a fairly loose coupling) and the antenna and ground disconnected. The wave meter connected as in Figure 7 is then set up near to and in inductive relation with the secondary inductance, and the buzzer set in operation. Then the detector should be adjusted to its maximum sensitiveness and the coupling between the wave meter and the closed circuit loosened until moderate response is obtained at resonance. The range of the closed circuit may be determined by switching in the smallest value of inductance, adjusting the capacity to zero, and then varying the wave meter condenser until resonance is obtained. The wave length as read from the wave meter curves is the lowest to which the secondary of the receiver may be tuned. For the other limit, of course, all the inductance and capacity is placed in the circuit and resonance is again obtained as above. This second reading will give the maximum wave length to which the set may be tuned. For convenience in operation it may be well to calibrate the wave length given at each tap of the secondary coil, for various capacity values of the secondary condenser. This permits preadjustment of the set to any given wave length. Close calibration and perhaps plotting of curves may be advisable around the wave lengths more often used. Incidentally the wave meter coils will give the actual dimensions of inductance coils suitable to cover certain ranges of wave length with a common capacity and hence will be a guidance in designing couplers for certain desired classes of work. The large inductance coil is suitable for loading up to the long wave undamped signals used in transoceanic work.

The wave meter itself may be used as the closed circuit of the receiver. It is merely necessary to bridge the rectifying detector arrangements around the condenser and inductively connect the wave meter coil to the antenna tuning inductance, or coupling coil if one is in use.

Determination of Inductance and Capacity by means of a Wave Meter

A wave meter having been constructed it is quite an easy matter to determine the unknown capacity of a condenser. Connect in series with the unknown condenser a standard inductance, excite the circuit by means of a buzzer, and determine its natural wave length by means of the wave meter. Now transposing the wave length formula

$$\lambda = 1885\sqrt{LC}$$

where L is expressed in microhenries and C in microfarads, we obtain

$$C = \frac{\lambda^2}{(1885)^2 \times L}$$

Having measured the wave length and knowing the value of the inductance in series with the condenser the capacity of the condenser can readily be calculated.

Having a known capacity and a coil, the inductance of which it is desired to measure, it is merely necessary to connect the coil in series with the known capacity, excite the system by a buzzer and measure its natural wave length by means of the wave meter. Then solve the transposed wave length equation

$$L = \frac{\lambda^2}{(1885)^2 \times C}$$

where L is expressed in microhenries and C in microfarads.

The First Post-War Trans-Continental

THE first transcontinental relay since the war has occured! And so easily was it done, and with such little fuss, that it points anew to the possibilities in our work before the winter is over. No special arrangements had been made for a transcontinental relay, and the messages went through the stations which were on the job at the time, the whole affair being marked by its spontaneity.

Here is how it happened. The night, Thursday, December 4th was very favorable in the east—one of those cold crystal-clear nights without a sign of static. Shortly after ten o'clock, Eastern Time, 8DA, Salem, Ohio (old 8JZ) called 1AW, Mr. Maxim's station in Hartford, with the east-bound message. This bore no filing date and it is probable that it was filed on the west coast the night before. The message, received at 10:15 p. m., was from Seefred Brothers, the A.R.R.L. Pacific Division Managers, at Los Angeles and traveled via 6EA, LF (Louis Falconi, Roswell, N. Mex.), 9BT, 8AD, 1AW. It read as follows:

Hiram Percy Maxim
Hartford Conn
Regards from 6EA
Seefred

Shortly after this, 1AW was in direct communication for an hour with 9ZN, Chicago, and at 11:15 p. m. Eastern Time Mr. Maxim started this message westward:

Seefred
Los Angeles Calif
Message received OK congratulations
Maxim

9ZN at first gave the message to Trump, 9BT, at Topeka, but a few moments later LF was hammering in at Chicago and 9ZN seized the opportunity and put the message direct to Roswell. All credit to Trump, though; his handling of the east-bound message, particularly the reach to 8DA, shows what he can do. LF made short work of it, and at 1:00 a. m. Mountain Time the message was acknowledged by 6EA.

This is splendid. It gives us all that feeling of exultation which comes only with the joy of achievement and seems in its deeper aspects peculiarly an emotion of the radio amateur. From the remarkable ease with which these same distances, and greater, are covered nearly every night, though perhaps not regularly across the whole face of the country on the same night, we will not be surprised when the day arrives when we are able to span the continent nightly with but one intermediate station.

The present work is largely due to the success of LF. Mr. Falconi, by the way A.R.R.L. Superintendent for the District of New Mexico, is most ably taking the place of old 9ZF, Denver, now out of the game, and Higgy of old 6DM, now located in Columbus, Ohio, who were our gateways in the pre-war days. It is interesting to note the only transcontinental route working at present is a combination of several of our regular trunks: the Northern or the Central route across the eastern half of the country, then south down the Mississippi Valley, and west via the Southern route. For some weeks LF has been working actively to bridge the distance, and in middle November succeeded in establishing communication with both 6EA on the west and 5AC, Vick of Houston, on the east. The rest was easy, and the Northern route, with one good intermediate station, could have done the same thing, as it is opened up for reliable communication as far west as North Dakota. The Southern route for short intervals has been opened thru its entire length, traffic having been handled from Los Angeles to Jacksonville via LF and 5AC.

Let us all regard this work as an incentive to greater activity, and hasten the completion of our regular routes whereby traffic may expeditiously and reliably be gotten to all parts of the country.

With The Affiliated Clubs

The subject of a closer co-operation between the various local radio clubs and the National Organization is becoming of increasing importance. Clubs, broadly speaking, are possible only in the centers, and as there is where the work needs to be done, the system rounds out nicely.

The problem of QRM control in the various centers is becoming most formidable. Amateurs in smaller places can have no adequate conception of the extreme difficulty of any distance operating around the larger cities. There is only one way in which this present intolerable state of

affairs can be remedied so that relay traffic can be handled thru such centers, and that is by organization and consistant cooperation. Local clubs in charge of local situations seem the most feasible solution, and the League is vitally interested in the success of such undertakings.

We invite all radio clubs to give consideration to the matter of affiliation with the A.R.R.L. The subject was treated at length on pages 6 and 7 of the August QST, to which attention is asked. The League Secretary will be glad to hear from the local Secretaries on this topic.

The following clubs have now become affiliated societies of the A.R.R.L.

New England Amateur Wireless Assn., Boston.
Radio Traffic Assn., Brooklyn.
Austin Radio Club, Austin Texas.
Council Bluffs Y. M. C. A. Radio Club, Council Bluffs, Ia..
Northern Indiana Radio Assn., Elkhart, Indiana.
Ravenswood Radio Assn., Chicago.
Milwaukee Amateurs' Radio Club, Milwaukee.
Dallas Radio Club, Dallas, Texas.
Houston Radio Club, Houston, Texas.
New Mexico State College Radio Club, State College, N. M.

The Traffic Manager summarizes as follows the service which affiliated clubs can render the League.

1. Control local QRM between the hours of 9 and 12 P.M., so as to avoid interference, as far as possible, with the regular relay work of the League.

2. Co-operate with the District Superintendents of the League for the local distribution and collection of trafic. Each club should appoint one or two stations as distributing centers and all local traffic to or from the regular trunk lines should pass through them.

3. Educate the younger element to obey the radio laws, as follows:

(a) Any amateur station that transmits and that can be heard by a licensed amateur station, is also required to have a license. The law is specific on this point.

(b) Transmitting by spark stations with a plain aerial, that is, without an oscillation transformer in the circuit to tune the circuit and keep the decrement down, consequently the wave sharp, is illegal. This particularily applies to spark-coil stations.

(c) Intentional interference is the worst form of outlawry any station can resort to.

4. Report all new licenses as fast as they are issued to the Secretary of the League, at Hartford, giving name, address and new call letters.

5. The League and QST are not money-making propositions for anybody. It is only desired that they be self-supporting. They are both handled by amateurs, of amateurs, for amateurs. They both depend upon the support of amateurs. United effort saved the amateurs when adverse legislation was introduced at Washington. One big thing local clubs can do is to boost the League, and boost QST by making the membership and subscription list include every known amateur in North America. The stronger the League becomes, the greater protection it can give you against unfair legislation in the future. Boost the League! Two dollars a year includes a membership and QST.

On November 20th a conference of the radio clubs around Greater Boston was called by Mr. Entwistle, and representatives from the various organizations got together and discussed their local problems. We regret very much that lack of space prohibits the report of this congress from appearing in this issue of QST, but it will be presented in the next number as a splendid example of the cooperation possible in the work, and in its excellent suggestions leads us to hope that a vigorous and sincere mutual effort and study of the problem will finally result in the establishment of working conditions around the large cities thru the medium of our affilliated clubs.

Active A.R.R.L. members are everywhere urged to get together and form societies which can exercise a degree of control over local situations so as to assist in relaying, and to affiliate with the parent body. The Secretary will be pleased to communicate and assist.

Recently a number of former Signal Corps members of the Radio Tractor Units doing Radio Intelligence work on the Canadian and Mexican Borders met at the offices of Walter Emmerick & Co., Fourth Avenue and 29th Street, New York, and formed a post of the American Legion to be known as the Radio Intelligence Post.

The following temporary officers were elected: M. K. Jacobs, President; John W. Hubbard, 1st Vice President; G. Bleilevens, 2nd Vice President; A. L. Bernhard, 3rd Vice President; E. Erickson, Secretary; W. A. Kahn, Treasurer; and C. J. Goette, Executive Member of Committee.

All former members of the above Units are cordially invited to correspond with the Secretary, E. Erickson, Harrison N. Y., with a view of joining this Post.

GREETINGS, CANADIANS !

After many requests and much consideration, the A.R.R.L. in this month's Operating Department report announces its expansion to embrace the Canadian amateur field.

For a long while our daily correspondence has been indicating the approach of the time when this step would be necessary, and we are happy to see it here. There are many good stations in Canada, many progressive amateurs, and already local routes to connect up Canadian cities with the old A.R.R.L. routes on this side of the line are budding forth. The union has much to offer of advantage. The traffic in both directions is growing fast, and by this amalgamation you Canadian fellows can get your traffic thru to any part of the States in an orderly and efficient manner. We hope that all of you who are interested in relay work will communicate at once with the Traffic Manager and let him have the benefit of your suggestions, to the end that routes may be decided upon and organization work commenced as soon as possible.

The difficulties of a trans-Canada route are not insurmountable, in spite of your restrictions, for your general operating conditions are much more favorable than ours. Can't we be of assistance in working out your technical problems? You are invited to make use of QST for this purpose. Relay transmission on 50 meters is an entirely new field to most of us, but we are sure it can be done. QST will welcome discussion and articles on this topic. For best results, should the transmission be by the usual spark method, by modulated V.T. oscillators, or by a big he-buzzer? What kind of a receiver will we have to have to get down to your fifty or seventy-five meter wave? Why can't we help to get your wave length limit raised? These are some of the things we would like to see discussed. The solution of all of them lies in organization, and that—our strong point—we offer you. We extend to you the glad hand of fellowship, our Cousins! Come on in with us!

SWINGING SIGNALS

"QTA pse OM faded"! How often we hear it, and seemingly how much more in these days of high amplifications than before the war!

This is as hard to understand as "dead spots." Some few stations seem never to swing at certain amateur stations, yet will fade badly at others and an entirely new group will be the ones who "never fade". But it isn't consistent, even with this, for don't you note the change from night to night, even from hour to hour? The stations who are swinging tonight will be superseded by a new bunch of swingers tomorrow night. And considering one swinging station by itself, the period of its swings will often vary greatly within a few hours. Some signals fade with a slow

barely perceptible but inexorable diminution of energy, while others may swing back and forth from an amazing audibility to a few-seconds interval of absolute quiet in a cycle lasting about a half minute.

It is distressing, and we ought to see if we can't find out what causes it. But we have nothing except theories. Of these, however, there are many: refraction, moving clouds, drifting aurora phenomena, swaying antennae or nearby trees changing the capacity so as to result in a loss of resonance, and so on. And many of us charge the street-car with being the offender, either by causing detuning or absorption as the period of the trolley circuit is changed by the moving car. There are countless interesting theories, but none which can be proved and which offer a chance for correction.

We wonder what connection there is between fading and the variation in the steady strength of signals from night to night. We know that one night we can work to the coast in one direction and won't hear a buzz from behind us, and the next night it will be reversed and all we can hear will be in the opposite direction. We must not forget that we amateurs are always working far beyond the rated range of our stations and depending on temporary favorable atmospheric conditions for our distance. The fickleness of the direction of this favorable condition, the astonishing strength of signals from some stations some nights when they are not swinging, and the proposition of fading in general, seem intimately connected.

Is there nothing we can do to solve the problem?

THE R. C. A. PAPERS

We take great pleasure in announcing the completion of arrangements whereby the excellent papers presented before the Radio Club of America will be published in QST. A similar arrangement was in effect before the war, and we all recall the helpfulness of the articles, some of which are truly classics and can be studied today with profit.

The Radio Club of America is one of the foremost bodies of radio amateurs in the country, and their hobby is the scientific side of radio. This year they are confining their attention to short-wave communication and the adaptation of war-time inventions to the improvement of amateur work, —a fact which will make their papers doubly interesting to us.

The first paper will be by their president, Major Edwin H. Armstrong, who is known to all of us, and will deal with a new system of high amplification of short waves—a topic of vital interest to us all. At the last meeting of the Institute of Radio Engineers Major Armstrong briefly explained the new system, but the forthcoming paper will describe it in detail and tell how to build the apparatus for 200-meter work. It will be a famous paper; watch for it.

THE A. R. R. L. EMBLEM

What do you think—we of the A.R.R.L. are to have an emblem, an identifying insignia of some sort whereby one A.R.R.L. man will recognize another on the spot!

Our organization has fast grown to the point where this is needed, and now we call on you for suggestions. What do we want, a pin or a lapel button? What shall the design be? How expensive shall it be? How about different colors—one for the membership at large and another for relay officials?

We want all of you to send in your ideas, for we need your help in deciding just what form our emblem shall take. As a starter we suggest that it be a button with the device around the edge and provided with a small blank space in the center, where, in quantities, we could provide it engraved with the initials or insignia of affiliated clubs, or where the individual A.R.R.L. man could engrave his call letters. This is up to you, however, and as to the design—you artists please sharpen up your pencils and get busy. Tell us what you want and we'll fix it up and make the emblems available just as soon as possible, and then we'll all know each other when we meet.

WRITE TO HIM

Remember the Bible text, "Do unto others as you would have them do unto you"? Well, put it into practice in amateur radio. If your spark was heard five hundred miles away and you were thinking it might be getting fifty, would you not feel pretty good to get a letter from some one at five hundred telling you that your signals were QSA? Of course you would. Then put the shoe on the other foot, and when you hear a fellow who is some distance off, drop him a line and tell him about it. It makes him feel fine and he immediately bucks up and does even better yet. Tell him about his tone, whether he is sharp or broad and whether he fades and what you received him on and whether his signals strengthen as his rotary slows down. The farther off you are the more important it is to write. We are all a brotherhood and it builds up friendships which may last a life time and be of immense value. We can recall several whom we corresponded with for years and with whom we are now close friends. And when you receive a note from some one telling about hearing your signals, don't fail to answer. If your spark is a particularly good one you will be asked what you are using to get it. Of course everybody is crazy to tell about his outfit. Here is your chance. Tell all about it. And one thing more. Write us once in a while here at headquarters. Tell us who you hear and how they come in. Take a shy at the mysterious fading business and anything else you have noticed. We like to hear from you too.

LONG DISTANCE 200 METER WORK

(Concluded from page 7.)

quenched gap, a hopeless proceeding from the very nature of things. This curious tendency to imitate the 500 cycle note at a terrible loss in signal strength is conspicuous in several of the amateur stations one hears. If they only knew that as they finished sending and their rotary slowed down their final signals quadrupled in strength, they might get over the fascinations of trying to imitate the 500 cycle commercial.

Amateur transmitting on two hundred meters wave length is only in its infancy. Vastly better performance is going to be accomplished than has been approached by even the best amateur stations, and it will not be by any new discoveries, but by common sense improvements in ordinary details as the different problems involved come to be better understood.

MASTS

(Concluded from page 8.)

slapped in a lot of these hurry up houses all around the yard the mast stood in and friend father decided to move away. Son tried to take the mast down but found he could not hang to the top of a 140 foot mast and pry loose 20 penny nails that had been clinched, especially since there was a good bit of uncertainty as to what would happen to the pryer when he succeeded. Also he could not cut the guys and let the mast fall without destroying a couple of "Palatial New Homes in Beautiful Robbery Park".

That was as far as I followed the case. The family has doubtless been compelled to stay there and is waiting for a cyclone or dirigible to lift the mast out of place vertically.

The Operating Department

J. O. Smith, Traffic Manager
Rockville Centre, L. I.

Owing to the increasing number of amateur radio stations in Canada and the fact that many of these stations can be worked by amateur radio stations in the United States, it has become apparent that by organizing the Canadian stations into relay routes the League is afforded a chance to greatly broaden its activities. In view of this, four divisions have been created in southern Canada and appointments as Division Managers for these four Canadian divisions will be made before the next issue of QST goes to press.

The four Canadian divisions and their territories are as follows:

St. Lawrence Division, comprising the provinces of Quebec, New Brunswick and Nova Scotia;

Ontario Division, consisting of the province of Ontario;

Winnipeg Division, consisting of the provinces of Saskatchewan and Manitoba;

Vancouver Division, consisting of the provinces of Alberta and British Columbia.

It is requested that all Canadian amateurs interested in the traffic work of the League write to the Traffic Manager and give him all possible information as to how relay, trunk and branch lines can be laid out to the best advantage through these four Canadian divisions.

Reports from the traffic officers of the League indicate that the volume of traffic to be handled is rapidly getting ahead of the facilities of the Traffic Department to take care of it. This is particularly true in the case of lines to connect New England and New York, New York and the Middle West etc. Efficient reliable stations are coming into commission slowly, but in most cases it has been necessary to relay the traffic over long distances, making dependable communication rather uncertain.

It is of course true that a great deal of long-distance work has been done, while the distances have been as great as 800 miles on an air line, but as conditions are vital in the case of such long distances, it has been possible to successfully handle only a part of the traffic, resulting in considerable delay in a great many cases.

When a sufficient number of stations have come into operation to warrant it, the long intervals now existing between relay points will, of course, be materially reduced, which will insure more frequent and reliable communication. This will gradually bring about the proper condition necessary to successfully maintain communication through having stations close enough together especially in the East, to maintain daylight service.

It seems to be true of the entire country that the more powerful and efficient of our stations have come into operation first. As fast as other stations come into service however, the practice of attempting to handle relay traffic over long distances should be abandoned, in favor of shorter relays, consequently more constant and dependable service.

The new traffic rules and regulations, which are printed on another page in this issue, should be carefully studied by everyone in the Traffic Department, in order to standardize the working of that department, and insure a more uniform method of handling the League's traffic.

The reports of the Division Managers, which follow, show conclusively that amateur radio is rapidly coming to the place it occupied before the war, when a message could be successfully transmitted across the continent and an answer received, in the same night.

All members of the League who operate transmitting stations and who are desirous of taking part in our relay traffic, should communicate with the nearest traffic officer, as shown by the following reports. We want everybody in the traffic organization that wants to come in. There is a place for everyone and plenty of work to do. Simply write the nearest traffic officer and that place will be found for your station.

ATLANTIC DIVISION,

C. A. Service, Jr., Manager,
Bala, Pa.

Reports of District Supts. and Asst. Division Managers for the month of November show a great improvement in practical results accomplished and relay work in the Atlantic Division is now well under way. It is safe to say that within another month or six weeks we will all be handling traffic in volume equal to pre-war days, with main Trunk Lines and Branch Routes in better conditions than ever before. There are still gaps to be bridged in the less thickly populated sections,

especially in northern New England and the States in the southern part of this Division but due to the constant efforts of League stations and the League traffic organization in charge of this work, these too will be developed altho it will take time owing to lack of good stations or long distances to be covered.

The report from Mr. Entwistle for the New England section of the Division shows the best stations are connecting up and the main Trunk Lines coming into form but there is a lack of co-operation and co-ordination of the medium powered stations which are depended on to form the back bone of Branch Lines and to cut down the necessity of long point to point relays on Trunk Lines. If stations depend on long distance relays to get traffic thru, it will soon cause a congestion at the large stations which they will be unable to take care of. Stations north of Boston are weak and should work all the more toward developing the semi-short distance relays since there seem to be no real recognized high powered stations up that way at the present time.

Altho the Canadian amateurs are showing much activity in their section, we have not been able to get a route thru to them which can be depended on. If there are any League stations able to work the Canadians reliably, they should not be backward about coming forward and letting their District Superintendent or Mr. Entwistle know the facts. Don't forget, you official stations, that relay routes are based on your reports of stations you work with, that they follow you and not you them, and the only way they can be properly mapped out is for you to get in touch with the officers of the Traffic Department and tell them what you are able to handle. As one of the Assistant Division Managers wrote me, "If the stations do not tell me whom they **can** work, how am I to tell them whom they **shall** work?"

Mr. McIntire's report is also interesting in giving results so far accomplished, which correspond closely with the report from the Northern Section and show the need of development of Branch Lines and short relays along Trunk Lines. The New York, Long Island and Staten Island districts are well equipped with good stations which can look after all the relay work near them and get it up thru New England, New York State, Philadelphia and the Middle West but how about the lines along the Jersey seacoast and the southern section of that State? Before the war, this part was practically never heard from, except Fry in Vineland, old 3NB; yet there are good stations all thru Jersey that are ripe to be picked and put aboard the relay band wagon. Connecticut has been handicapped the same as Jersey with longer distances to cover but things are rounding out well and by the time this report comes out, it is hoped all will be O K with them.

The Southern Section of the Atlantic Division presents the greatest relay problems of all, with the possible exception of Northern and Western New England, on account of long distances to cover and peculiar transmission characteristics which have made it almost impossible to work along the Atlantic Seaboard altho work with Middle West stations has been relatively simple. Mr. Stewart, the Assistant Division Manager for this Section, and his District Supts. have made every effort to open up the line between Philadelphia and Washington thru to the South and their reports for this month are much more encouraging than in the past. However, up to the present, no station between Philadelphia and Baltimore has been found which can break up this gap, altho it is hoped a good station in Wilmington, Del. and Havre de Grace, Md., or Perryville, Md. can be found to handle this work. Mr. Gravely, Danville, Va., District Superintendent for Virginia, has an excellent station and can be depended on to relay from Baltimore and Washington to stations in the East Gulf and Middle West (Central) Divisions.

Throughout Pennsylvania there are many good stations which have not yet been assigned a definite place in the relay scheme as it is uncertain or unknown what they can do but it will take but a short time to line them up if they will communicate with their District Supts. or Mr. Stewart. Several District Supts. have been appointed during the last month in the Southern Section of the Atlantic Division and stations which come within their jurisdiction are urged to write immediately for their mutual benefit.

In conclusion, the Division Manager wishes to mention a movement among the Boston amateurs which has come directly to his notice, that will sooner or later take form as a nationwide movement in all sections and communities where any radio congestion exists. There was a meeting held of representatives of prominent Boston and New England amateur associations to discuss present difficulties arising out of the situation that much unnecessary interference is experienced by lack of some arrangement whereby all stations can enjoy the right of operating and yet not monopolize the rights of others. The situation received a general, preliminary discussion, the point of view of the spark coil, the experimenter, the relay station and the local amateur being presented and considered and the following tentative remedies being suggested.

1. Central control station for traffic and communication control, to see all have a fair show and no one encroaches on the rights of others.
2. Use of other waves besides and below 200 meters for local work.
3. Elimination of broadly tuned stations and thoughtless or willful interference.
4. Use of minimum power to ensure reliable communication.
5. Time limits for local and long distance work.
6. Punishment of persistent offenders.

Amateurs from one coast to the other have been thinking this question over for a number of years and the Boston convention is only one example of what other associations have done or tried to do.

ATLANTIC DIVISION,
(Northern Section).

Guy R. Entwistle, Ass't Division Manager,
136 Sutherland Road,
Brookline, Mass.

The relay situation in New England has at last passed from the "indoor sports" stage where we lined up our possibilities on paper to the actual state of an operating chain. Our Southern shunt seems to be coming along first in actual working, having established communication from Boston thru Fall River, Kingston, R. I. thru to points in New York and Ohio.

The main inland route is stalled at Worcester as our man there is trying to convince the electric light people that he doesn't want to buy them out but merely wishes to have a meter installed. At the Polytechnic Institute in Worcester the powers that be are still trying to determine the best hook up so they haven't got started yet.

Lieut. Edward A. Gisburne, of 12 Oakley St., Dorchester, Mass., has been appointed District Superintendent of the southern section of greater Boston, Mr. Pulley remaining in charge of the northern section. Lieut. Gisburne was in charge of WBF station during the war and is an operator of long experience. He was given a Congressional medal for bravery under fire during the trouble at Vera Cruz, Mexico. His act consisted in carrying a wounded comrade back to their ship after both he and his comrade had been wounded, Lieut. Gisburne so severely that he lost a leg.

Many of the local amateurs have copied 2's, 8's, and 9's but only a few have succeeded in being heard themselves in these places, and fewer still have succeeded in establishing regular communication with the 2's. Messers Lewis and Coleman of Cambridge and Milton, 1DL and 1AS, have been among the first to do so. 1AS works 2CS; 2CM; 2ZS regularly. 1DL works 2CS also. 1BL has been heard at 8JZ, and has worked 2CS.

Mr. E. B. Dallin, 1FK, has probably the best receiving outfit around Greater Boston from the standpoint of results. The members of the New England Amateur Wireless Assn. have listened profitably to his talks on audion detectors and amplifiers. Ensign Dallin stands a watch at 1AF, formerly 1LE.

There are several wireless phone sets working nearby: 1DQ; 1DA; both have started something along this line.

North of Boston still seems to be the weak part of our chain thru to Eastport. Dist. Supt. Harry McLean reports his station ready for ARRL work. He, (1CM) hears 9ZN, 8NH, 2LO, 2JU, 2ZS, 2ZM, 1CZ, 1CS, 1CN, 1AS, 1FG.

Harold Bean has been appointed to look after things in Concord and Pennacook. Robert Parker has Tilton under his care. Mr. McLean wants to hear from amateurs in Manchester and Berlin (USA).

E. W. Whittier, 1DH, reports the following heard at Winthrop. 9AU, 3AN, 2JU, 8JZ, 2YM, 8XU, 9ZN, 8AA, DC.

Mr. Sumner B. Young, of the Harvard Wireless Club, reports trouble with the apparatus, armature burned out. Expects to get going soon. He hears the following at his own station, 1AE. (2ZM, 2ZS, 2JU, 2DA, 8AH, 8NH, 8AHI, 9ZN, and 2CS.)

The writer had the honor of speaking before the members of the Technology. Wireless Club on relay matters at their last meeting. About 100 men were present, the majority being former relay men and ex-commercial operators. At Teck they will have an operator with a commercial license every night; there are 25 of them so each man will have to wait three weeks for his second trick.

From Portland Maine comes the following news.

Cassinau and Ham, local ARRL men, are getting things lined up in Maine. A club of ex-service men is being formed with the object of developing amateur radio activities up North. Cassinau was at Otter Cliffs with 9HS, Wm. Woods, and obtained valuable experience at the premier receiving station of the Navy during the war.

Mr. L. B. Hilton of Lewiston, Maine, President of the Twin City Radio Club has entered the relay game. He will serve as a connecting link between Portland and Bangor.

We are glad to hear that District Supt. Harold C. Bowen, 1AK, has signed up a second operator, Mr. Wm. H. Buffington of 836 Maple St., Fall River, who will handle traffic thru that city when the chief is away. 1YA, Rhode Island State College, is in the league and serving as a link in our southern chain to New York. 1AK is

heard QSA in Boston. He hears 1YA, 2JU, 2ZS, 8AHI, 8RD, KJ, CC. Bowen strongly recommends that every station have an **individual** schedule with any station he is sure of working regarding the time each can clear traffic so as to eliminate unnecessary QRM caused by continuous calling. Bowen wants to hear from amateurs in Providence, Taunton, and Attleboro, and all other places in Southern Mass. and Eastern Conn. and R. I.

Bates of Worcester hears the following at his station 1GY. 1AY, 1GB, 1AZ, 1DC, 1AK, 1AN, 2DA, 2ZU, 2YM, 2ZM, 2GA, 2JU, 2ZS, 8NS, 8AA, 8XU, 9ZN,

Nothing new has been heard from Our Canadian Ambassador Mr. Albert J. Lorimer. Everything must be progressing favorably in the St. Lawrence region.

Just as we go to press a report comes from the Nashua (N.H.) Radio Club. Mr. Norman C. Wheeler is President.

The younger generation of amateurs around Boston have organized themselves into a club called the Greater Boston Radio Club. These boys are beginners for the most part, taking around five words per minute, and struggling with the mysteries of radio so as to be able to pass the amateur exam. They are meeting Saturday mornings at 18 Boylston St., Boston, Room 20, at ten o'clock.

ATLANTIC DIVISION, (Middle Section),

M. A. McIntire, Ass't Division Manager,
1127 Avenue G,
Brooklyn, N. Y.

At last things are beginning to boom again in this district. Stations are beginning to show some real life, and real work is being accomplished. The distant stations are coming through in fine shape. Also, our eastern stations are beginning to pound through, and if the number of messages cleared through the writer's station is any indication as to what is being done elsewhere, we surely are on the job.

Mr. Lester Spangenberg, Dist. Supt. of Northern New Jersey reports the following stations for business on the route from New York to Philadelphia: New York to Lake View, N. J. (2ZM): Lake View, N. J. to C. F. Mueller Jr., Elizabeth, N. J. (2JZ); New Brunswick, N. J., N. Dunham Brothers, (2LO); Trenton, N. J. Applegate Brothers; also E. G. Raser, (3NG) Trenton, N. J. Mr. Raser is in communication with a number of Philadelphia stations, so this line is well formed and in operation. On the line to Washington, D. C., 3AN in Baltimore, Md. is easily worked by 2ZM, Lake View, N. J., and traffic is being handled through this station to Washington. In regard to line to Chicago, Ill. 2ZM has been sending traffic via 8JZ, Salem, Ohio, also other stations in or near Cleveland, Ohio. 9ZN of Chicago is also being worked but it is our aim to shorten the length of lines so that it will not be necessary to shoot traffic over such long distances.

Mr. Runyon, 2ZS reports that the line up the Hudson will soon be in operation. 2DA, Poughkeepsie, N. Y. is again on the job, and additional stations will soon be ready for operation. It is hoped that stations will send in their names, addresses, and other data to Mr. Runyon, in order that lines can be established throughout the State.

Mr. Nichols reports that things are running smoothly in Connecticut, but that as it was before the war, it is extremely hard to work stations in the vicinity of New York City. His fine tone 1 KW Marconi spark is easily readable in the City (1BM) and it is hoped that when he gets his new 2 step amplifier working that he will be able to hear us. He reports that other stations in the state will soon be working and we know that New England will be able to shoot traffic almost anywhere in the south via stations in New York City.

Mr. Cliff. Goette reports that he has been in communication with a number of stations both in the west and to the north of us. He reports that he has cleared a number of messages from 1AS, Milton, Mass, and that very little difficulty is experienced working that station. Also old 2ZP, now 1LR, is now opened and should prove of great help. A canvass of Long Island in the vicinity of Oyster Bay and Huntington was made but no stations could be found. We need some stations on Long Island and if any are there that we have overlooked, please be good enough to communicate with us. Credit should be given to Mr. Schaeffer of Staten Island, (one of our old-timers, 2CS), and to Mr. Foggetti (2WB) of Brooklyn for the good work they have done in handling western traffic during the month.

With the Prospect Radio Club and Radio Traffic Association of Brooklyn, and the East Side Y.M.C.A. of New York assisting in the delivery and collecting of messages in the fine manner in which they are doing, and with the help of our main stations in this vicinity, namely 2ZS, 2ZM, 2ZV, 2JU, 2CS, 2WB, 2YM, and others, we feel sure that in a short time we will have lines reaching into all our neighboring states which will be in first class working order.

ATLANTIC DIVISION
Southern Section

Chas. H. Stewart, Ass't Division Manager,
St. David's, Pa.

The amateur activities of the District have seemed slow to come to life after the long period of inactivity, but this is

due to some extent no doubt to the fact that all licenses have to be renewed. Due to this and other causes there is not yet as much activity as we would like to see.

Mr. W. T. Gravely, 503 Main Street, Danville, Va., the District Supt. for Central Virginia, states that he is still without definite information regarding the possibility of an efficient station in Richmond, but is hoping that a station will be found there to assist in the relay work on Line D. Mr. Gravely mentions the splendid receiving work of Mr. A. L. Groves, of Brooke, Va., and only regrets the fact that he cannot get into the transmitting end due to the lack of electric power.

Mr. Raymond L. Schaefer, 139 B. St., S. E.. Washington, D. C., Dist. Supt. of Columbia, reports that there are at least five power stations in operation there, the owners of which are members of the local club, and they have all promised to give their support and co-operation to the League. He states that he has made arrangements, so that official stations doing duty on their specified nights will have the right of way over all other stations of their club, which seems to be an admirable arrangement.

At the request of Mr. E. B. Duvall, 4004 Park Heights Ave., Baltimore, Md., Supt. Eastern Maryland District, his appointment of Mr. Donald Primrose, of Elkridge, Md. 3AA as Ass't District Supt., has been approved. Mr. Primrose has been identified with amateur radio in the Baltimore District for some time, and no doubt will be of considerable assistance to Mr. Duvall in promoting the League interests in that territory. It is the intention to make tests between Baltimore and Philadelphia or Wilmington in the near future, and anyone who thinks he can be of assistance on this route is invited to communicate with Mr. Duvall or with me, and every effort will be made to co-operate. We will either of us only be too glad to advise with anyone on this route concerning possible improvements in their transmitting and receiving sets, and will endeavor to do what we can to offer suggestions that will be of assistance. From what Mr. Duvall says it seems that already signals from Baltimore have been heard in Washington during the daylight hours, which indicates a big advance over pre-war days, when this distance of 40 miles was never satisfactorily bridged, due partially to peculiar local conditions. This fact leads Mr. Duvall to believe that the past failure to accomplish this is about to be overcome possibly due in part to the uses of more advanced apparatus, and to experience gained during the war.

Since the last report, Mr. Charles S. Horn, Jr., 909 Monroe Street, Wilmington, Del. has been appointed Dist. Supt., for the State of Delaware, and all stations interested in the work of the League are requested to communicate with him without delay.

In connection with the Eastern Pennsylvania District, it is regretted that owing to business reasons Mr. McCaskey has tendered his resignation as Dist. Supt. to take effect from November 1st. No appointment has yet been made to fill the vacancy caused by Mr. McCaskey's resignation, but this matter is receiving attention. Under the present circumstances the Ass't Division Manager is endeavoring to look after the Eastern Penna. District pending the appointment of a new Superintendent, but as he has his hands pretty full already some delay in correspondence is inevitable, and this explanation is made so that the matter will be understood. Several stations in Philadelphia have opened up, and as Philadelphia is the starting point designated by the Traffic Manager for Line B to the West Coast it is important that Philadelphia do its part in the future relay work, as it started to do in earnest just before the closing down of the stations at the outbreak of the war.

Mr. W. A. Cawley, R. D. No. 3, Milton, Pa., District Supt. for Central Pennsylvania District, who has been absent from home for the past several months, reports that he is again back on the job, and ready to take up the organization of the relay work in his District. For some reason, which he does not state he advises that State College is out of the question for relay work for the present at least. He reports that he has failed to hear until recently of any Harrisburg amateurs, and that as an alternative they had been planning to conduct the relay work on Line B so that it would go via Reading Pottsville and Milton. The last report from this District states that on the whole things look very encouraging for the future of the A.R.R.L. trunk lines and relay work.

The Ass't Division Manager has been in communication with parties in the Pittsburg district looking to the appointment of a District Superintendent for Western Pennsylvania, with the result that he has just appointed Mr. Charles H. McSwigan, 3135 Stulen Street, W. E., Pittsburg, Pa. as District Supt. in charge of the League traffic in the western end of the State. Now that this section is represented, it is hoped that the organization work will proceed rapidly, and that work on Line B, will soon show results.

It is desired to appoint a District Superintendent in the Western Maryland District, as soon as some one can be found who is sufficiently interested to entrust the work to.

EAST GULF DIVISION.

John C. Cooper, Jr., Manager.
Jacksonville, Florida.

The Division Manager is still without a station. I have recently completed a new house and expect to put in a station shortly. However, as the Navy department now operates the former Marconi station in Jacksonville I will be limited to one-half KW. Radio work is beginning to open up to some extent and the chances for a Southern Trans-continental route look very bright. Assistant Division Manager Clayton at Little Rock, Ark. sent me a message broadcast a few nights ago which was picked up at a station on the East Coast of Florida and forwarded to me. He wished to know when we would be ready with messages for the Pacific Coast. Mr. Clayton has furnished an excellent report of progress for the month in the Western Section of this Division. He reports that his call is now 5AF; that the prospect for Trans-Continental traffic is very good via the station LF, operated by Mr. Louis Falconi, at Roswell, New Mexico, which station comes in very strong at Little Rock and apparently is in constant touch with 5AC at Houston, Texas. Thus far all Traffic between the East Gulf Division and West Gulf Division has gone direct from Mr. Clayton to 5AC and this route, apparently in connection with 5BB at Franklinton, La., will be the future main trunk line, although this has not yet been positively determined. Mr. Clayton has thus far handled forty-three messages almost all of them going to Texas points and being delivered from or through 9ZN. 5AF is apparently a most efficient station and the Division Manager feels that his choice of Mr. Clayton as Assistant Division Manager has been fully justified. Mr. Clayton has worked with the following stations in the last month: CC, CV, DC, GC, FH, GH, LF, 5AC, 5AG, 5AL, 5BB, 5BP, FC (ex 5ZC), 8AHI, 8AA, 8ASG, 8ADX, 8JZ, 9AJ, 9AU, 9AP, 9HN, 9HU, 9JW, 9PO, 9VF, 9VP.

Unfortunately the same amount of progress cannot be reported for the Eastern Section of this Division. Several stations are working but real relay work is nct yet under way. The same lack of interest still exists in North Carolina and South Carolina and no appointments at all have been made in those States. Experienced amateurs in those States are again requested to write direct to the Division Manager as it is still desired to organize those two States into a separate section under an Assistant Division Manager. All amateurs in Mississippi, Alabama, Georgia and Florida should communicate with Assistant Division Manager W. B. Pope at 197 Dearing Street, Athens, Ga., who is in charge of the Eastern Section of the East Gulf Division. Mr. Pope (4AG) is again on the job and if his relay work turns out as good as it was before the war, there will be few better in the country. There has always been serious difficulty in handling messages from North to South along the Atlantic coast lines but it is hoped that Mr. Pope with the co-operation of all the good operators in this part of the Country will be able to solve the problem.

CENTRAL DIVISION

R. H. G. Mathews, Division Manager,
1316 Carmen Ave., Chicago, Ill.

During the past month, traffic relay work has been booming in the Central Division. Owing to the splendid work of the District Superintendents, messages are now being handled to practically all points of the Division, with the exception of Kentucky and West Virginia. Almost all the Supts. have stations in operation and are able to communicate with the Division Manager direct. A large amount of League business has been handled in this way, such as the appointment of official relay stations, reports, etc. The Division Manager wishes to encourage the Dist. Supts. in the transmission of reports etc. to the Division Manager either direct or by way of the regular Trunk Lines.

Traffic routes are open east and west from Youngstown, Ohio, to Topeka, Kansas, and north and south between Winnipeg, Man., Canada, and Little Rock, Arkansas. 5AF at Little Rock reports his routes open to Houston, Texas, and Pensacola, Florida, connecting with those of the Central Division at Little Rock.

Messages are being consistently handled for practically all points in Ohio, Illinois and Kansas, and for many points in Wisconsin, Michigan, Missouri, Minnesota, North Dakota and Iowa. Consistent daylight communication has been effected by the Division Manager with Southern Illinois, via 9CA, and with Ohio, via 8AA. This marks a new era in relay work, and advantage will be taken of it to clear as much Illinois and Ohio traffic by daylight as possible. An attempt is being made to put a message through from Chicago to Hartford entirely by daylight. To date this message has reached New York City.

Especially good traffic work has been done by 8AA, Supt. of Western Ohio, and 9BT, Supt. of Kansas. These two stations have been in operation nearly every night and have handled a large amount of relay traffic.

Other Dist. Supts. whose stations have been doing excellent work are 9VP of St. Louis, FH of Indianapolis, LXA of Valley City North Dakota, CC of St. Marys, Ohio, 9CA of Minonk, Ill., and JAG of Baudette, Minn.

Mr. H. J. Burhop of Sheboygan, Wis., Mr. Patch of Dubuque, with his Assistant, Mr. Hammond, of Oelwein, and Mr. Keller, of Kearney Neb., with his Assistant, Mr. J. G. O'Rourke, of Omaha, have been particularly in organization work during the past month, although Mr. Schultz and Mr. Hall of St. Paul, Minn., Mr. Gjelhaug of Baudette, Minn. and Mr. Hamilton and his assistants of Indianapolis have not been far behind.

The amateurs in the districts of Western Missouri, Iowa, Nebraska, and South Dakota have been very backward in offering their services to the League. All station owners in these territories are urged to communicate at once with the proper Superintendent as shown below.

Western Missouri—G. S. Turner, 124 S. Pearl St., Independence, Mo.

Iowa—C. W. Patch, c/o Farley and Loettscher Mfg. Co., Dubuque, Ia.

Nebraska—S. L. Keller, 2221 Central Ave., Kearney, Neb.

So. Dakota—Harold Larson, 1st National Bank, Viborg, S. D.

Dist. Supts. have been appointed for the Districts of southern Michigan, Illinois and North Dakota. They are as follows:—

Dist. Supt. of Illinois, having jurisdiction over the state of Illinois, with the exception of the City of Chicago—W. S. Taylor, 9CA, Minonk, Ill.

Dist. Supt. of southern Michigan, having jurisdiction over the southern peninsula of Michigan—C. E. Darr, 137 Hill Ave., Detroit, Mich.

Dist. Supt. of North Dakota, having jurisdiction over the state of North Dakota —R. H. Pray, (LXA) 813 5th Ave., Valley City, No. Dak.

In addition, Mr. Gena Graves, Kansas Gas and Elec. Co., Wichita, Kans. has been appointed Ass't. Supt. of Kansas, under Mr. Trump, of Topeka, and Mr. G. W. Pilgram, 710 S. 19th St. Joseph, Mo. has been appointed Ass't. to Mr. Turner, Supt. of Western Missouri.

Amateurs in these districts are urged to write these men at once for station appointments, as they wish to build up branch routes to all parts of their districts.

Mr. H. L. Loveless, former Dist. Supt. of Kentucky, has written that he will not be with us in the radio game this year, owing to an unfavorable location for radio. Accordingly applications will be received by the Division Manager for a Superintendent to take his place.

The following City Managers have been appointed by the Division Manager on recommendation of the Dist. Supt. of Southern Wisconsin.

Mr. Leroy A. Degner, 294 24th Ave., Milwaukee, Wis., City Manager of Milwaukee.

Mr. Laurence Pfeiler, 1810 N. 5th St., Sheboygan, Wis., City Manager of Sheboygan.

Mr. Chas. T. Schrage, 229 W. Gilman St., Madison, Wis., City Manager of Madison.

The Dist. Supt of Southern Wisconsin, Mr. H. J. Burhop, 1426 Illinois St., Sheboygan, Wis. is especially anxious to have all southern Wisconsin amateurs write him at once, giving data on their stations and their radio and other experience, in order that he may appoint official relay stations, etc.

Mr. Chas. H. Zeller, 9AU, 4732 N. Maplewood Ave., Chicago, has been appointed Administrative Assistant to the Division Manager and given charge of club affiliation and formation throughout the Division. In addition his station has assisted materially in the message relay work through Chicago.

Mr. D. N. Buck, 9AD, 5332 Kenmore Ave., Chicago, and Mr. G. A. FitzSimons, 1324 Carmen Ave., Chicago have been appointed Traffic Assistants to the Division Manager, standing watch at 9ZN and in addition operating 9AD to good effect.

Attached hereto is a list of branch routes in the state of Kansas.

Modified Trunk Routes in the Central Division are as follows:—

Line A (New York to Seattle) (Central Division Section)

8VP (old call) A. J. Ball, Hubbard, Ohio —8ADX (old call) Ashland Ohio—8AA K. A. Duerk, Defiance, O., with 8ER, St. Marys, O. as alternate—9ZN, R. H. G. Mathews, Chicago, with 9AU, C. H. Zeller, Chicago, as alternate,—9ST, Superior, Wis. with RO, Superior as alternate—JAG, J. A. Gjelhaug, Baudette, Minn.,—LXA, R. H. Pray, Valley City, N. D.,—??

Line B (Philadelphia to San Francisco) Branch 1.

8VP (old call) A. J. Ball, Hubbard, O. —8ADX, (old call) Ashland, O.—8AA K. A. Duerk, Defiance, Ohio with 8ER, St. Marys, O., as alternate,—9ZN, R. H. G. Mathews, Chicago, with 9AU, C. H. Zeller, Chicago, as alternate—9BT, R. K. Trump, Topeka, Kansas, with 9NE, Lawrence, Kans. as alternate,—??

Line B, Branch 2.

Same as Branch 1 to 8AA, Defiance, O. then FH, F. H. Hamilton, Indianapolis, Ind.—9BR, J. A. Crowdus, St., Louis, Mo., with 9VP, St., Louis, Mo. as alternate, 9BT, R. K. Trump, Topeka, Kans. with 9NE, Lawrence, Kans. as alternate,—??

Line E (Winnipeg, Man., Canada, to New Orleans.)

Winnipeg Radio Club (call not known) —JAG, J. A. Gjelhaug, Baudette, Minn., —9ST, Superior, Wis. with RO, Superior Wis. as alternate, 9ZN, R. H. G. Mathews,

Chicago, with 9AU, C. H. Zeller, Chicago, as alternate, 9BR, J. A. Crowdus, St. Louis, Mo. with 9VP, L. A. Benson, St. Louis, as alternate, to Little Rock, Ark., 5AF, there connecting with the East Gulf Division and West Gulf Division.

These routes have been in effective operation for the past few weeks, but will be modified from time to time as new stations appear.

WEST GULF DIVISION,
F. M. Corlett, Division Manager,
1101 East Eighth Street, Dallas, Texas.

During the month of November the Division Headquarters was honored by a visit of our Traffic Manager, Mr. J. O. Smith. I wish that every amateur in the Division could meet our Traffic Manager personally. It was indeed a pleasure to be so honored and I hope we may again have the pleasure, but for a greater length of time.

Stations throughout the Division seem to be opening up rather slowly, however the ones that are getting in the air are doing some good work.

Trunk Line "C" will probably take the following route across this Division, taking the stations that have already opened up as a basis for determining the route. Connection with the East Gulf Division will either be via Houston, Texas in the Southern District of Texas or via Greenville in the Northern District of Texas or both, the Houston route continuing to Austin thence to Roswell, N. M., the Greenville or Northern route continuing to Dallas thence to Roswell, N. M. From Roswell the route will continue West to Las Cruces, N. M., thence to Warren or Bisbee, and Phoenix, Ariz. Of the above named places that the Division Manager is sure of a dependable station are Houston, Greenville, Austin and Dallas, Texas, Roswell, N. M. with promises of stations in Las Cruces, N. M., Warren and Phoenix, Ariz. As "LF" at Roswell has not yet heard any stations West of him it is assumed the Arizona stations are not yet working. It is readily seen that there are some long "jumps" to be bridged in order to assure consistent relay work. The distance from either of the Texas stations, Houston, Austin or Dallas, to Roswell, New Mexico is between 400 and 500 miles. Although traffic has already been handled Roswell and all three of the Texas stations this distance should be shortened in order to make it a dependable route under all conditions.

Appointments have been made as follows:— Cecil F. Butcher, 5AL, 1603 North Stonewall Street, Greenville, Texas, Assistant District Superintendent, Northern Texas District, and has been assigned the territory of Fannin, Hunt, Lamar, Delta, Hopkins, Rains, Wood, Red River, Franklin, Titus, Camp, Upshur, Bowie, Norris, Cass, Marion and Harrison Counties, same to be known as the GREENVILLE TEXAS TERRITORY. All amateurs located in any of the above counties should get into communication with Mr. Butcher either by radio or by mail giving him a detailed description of your station, your call letters, etc.

Mr. Cecil Sylvester Westmoreland, 1616 Herring Ave., Waco, Texas, City Manager of Waco, Texas.

Reports of District Superintendents.

Southern Texas District,
James L. Autry, Jr., Dist Supt.

Long distance radio has at last opened up in this District. 5AC, C. W. Vick, of Houston has succeeded in communicating with Topeka, Kan., St. Louis and other closer out-of-the-State stations. The sending side of the Dist. Supt's. station is not quite complete due to pressure of academic duties but within two weeks, if all goes right, 5AB will be in prime condition. Other stations in Houston are under construction.

The Austin Territory is devoid of relay material except in the city itself. There, Asst. Dist. Supt. W. Tilley, 5AS, has his station working very efficiently as judged by intensity of signals in Houston and also by the fact that he works Roswell, N. M., easily. 5AS is supported in Austin by Frank Rivers, and the Austin High School, neither of which as yet have received official call letters.

The San Antonio situation seems unsolvable. Any number of letters to prospective amateurs meet with absolute failure. If a reply can be obtained it is always full of pesimistic views of the future and no one will take the responsibility of getting behind the thing and pushing.

I hope next month's report will be more favorable along broader lines.

New Mexico District,
Louis Falconi, Dist. Supt.

With this report I am pleased to say that the situation in New Mexico is most encouraging. The State College at Las Cruces has applied for membership in the A.R.R.L. This college has a ½ K.W. set of the highest type and should be valuable for the League. Mr. Davis of Deming is making progress in the construction of his apparatus and has secured his license, being assigned call letters 5AM. He expects to have his outfit working soon.

There seems to be a lamentable scarcity of stations in Arizona. Were it not for that, communication might have already been made with Calif. Isn't there someone in Arizona with a Station? In all

other directions there seem to be numerous stations to connect New Mexico with other relay routes. My station is the only one operating to date. Very good results have been secured with 5AC at Houston, Texas, FC at Dallas, Texas, and 9BR of St. Louis, and several others. The farthest station communicated with is LXA at Valley City, N. D. Sorry to say not a single station has been heard West. It's time for the West to be awakening.

The Houston Radio Club and Dallas Radio Club have both made formal application for affiliation.

PACIFIC DIVISION.

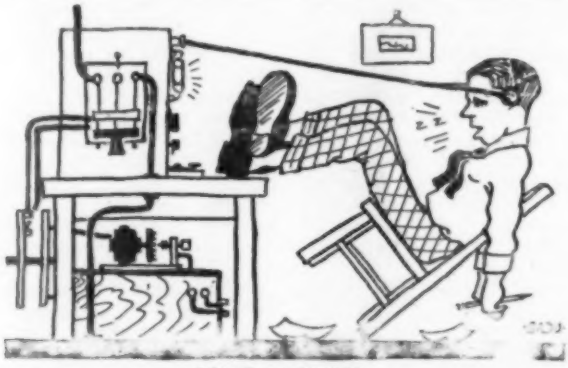
Seefred Brothers, Managers, 343 So. Fremont St., Los Angeles.

Long distance work began Oct. 31, 1919, on the Pacific Coast. We have communicated with 6BQ—Reno, Nevada. Have handled five messages for the San Francisco district and Bay Cities via 6BQ (ex-6AV), because communication between San Francisco and Los Angeles is very unreliable. So far Reno, Nevada (400 miles) is the farthest amateur radio station communicated with by us, in fact, this is the longest range covered on this coast to date. Received a letter from "LF" (Louis Falconi of Roswell, New Mexico) stating that he has heard us (6EA) and 6AV (now 6BQ) of Reno, Nevada. "LF" states that this route (southern division) is the most promising thus far across the U. S. He is in touch with all others in different directions, and that the only missing link is between Roswell, New Mexico and Los Angeles, California. We are making tests with "LF" and 5AC at Houston, Texas, every night at certain times until this link is connected.

We have held communications with 6AT and 6ACC of San Jose, Calif., 6AE of Stanford University, Calif., and have heard 6WZ of Burlingame, Calif., 6AU of San Jose, Calif., 6BB, University of California, Berkeley, Calif., "WG" at Walnut Grove, Calif., 6AY (don't know "QRA") and we expect to give "QST a better report on long distance relay work next month.

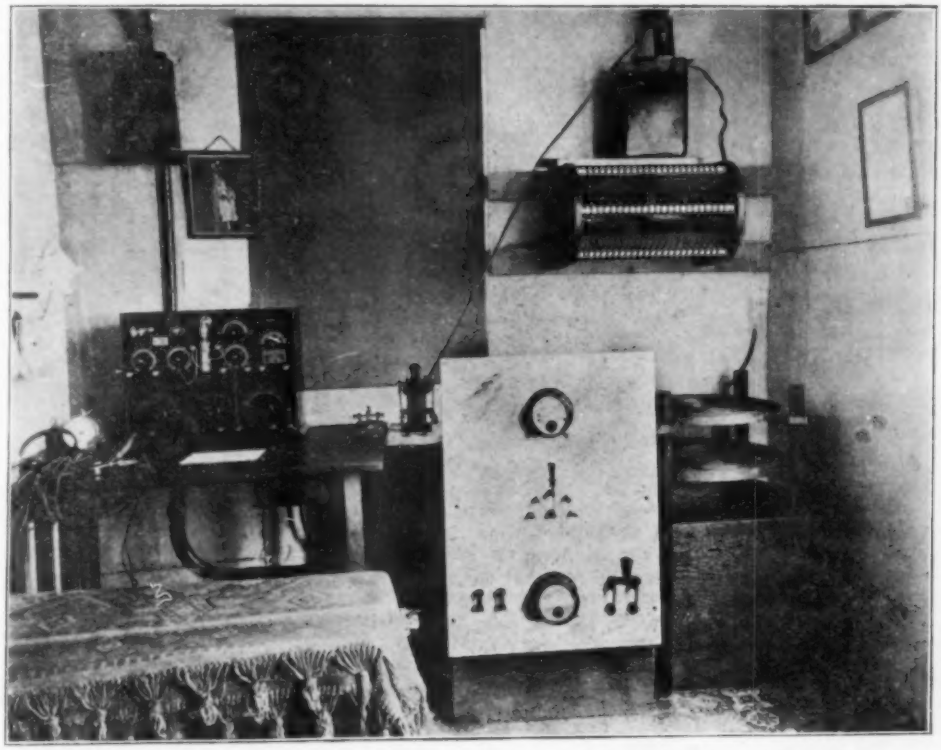
Well fellows, at last we have a good radio man for San Diego. He is our old friend 9ZF—Mr. E. F. Doig of Denver, Colo. He will be a excellent relay station for San Diego, Calif., with all the experience he had at station 9ZF. He has sold his old set to the Manual Training School in Denver and is going to build one for installation in San Diego for this winter. He probably will be back in Denver next winter.

Trunk line "B" starting from San Francisco east is progressing slow but sure. The district radio inspector is very slow in issuing new calls, so it will be another month before definite calls will be in use. Trunk line "B" will go from San Francisco via Walnut Grove, and Sacramento, on to Reno, Nevada. 6AV (old call) at Reno, Nevada seems to be the only station in that state and will have to make an odd 500 mile jump east to Salt Lake City, Utah, before trunk line "B" will be connected to the Rocky Mountain division. Trunk line "G" is in a bad shape as in the pre-war days. The jump from San Francisco to Portland, Oregon is very roughly 600 miles, which is across mountainous country of altitudes ranging from 6,000 to 14,000 feet. There are no stations capable of handling the traffic between San Francisco and Portland. The route may have to be changed so as to follow Trunk Line "B" as far as Reno, Nevada or Salt Lake City, Utah and then branch north through Idaho. Trunk Line "G" running south from San Francisco to Los Angeles will be going fine in a couple of months, we hope. We are counting on a few relay points, one probably at Fresno. Due to bad "QRM" from the spark coils and beginners it is impossible to do any long distance work before 10:30 or 11 P.M.



SOLID COMFORT

RADIO 9ZN



Radio 9ZN, the station of the Central Division Manager, is located at 5525 Sheridan Road, Chicago, Ill., on the shore of Lake Michigan.

The station consists of a two room, one story frame building situated midway between the two towers supporting the antenna. The building, towers and plane of the antenna are in a north-and-south line, at a distance of 60 feet from the edge of the lake. Because of this location, the station is clear of practically all high buildings and obstructions in all directions.

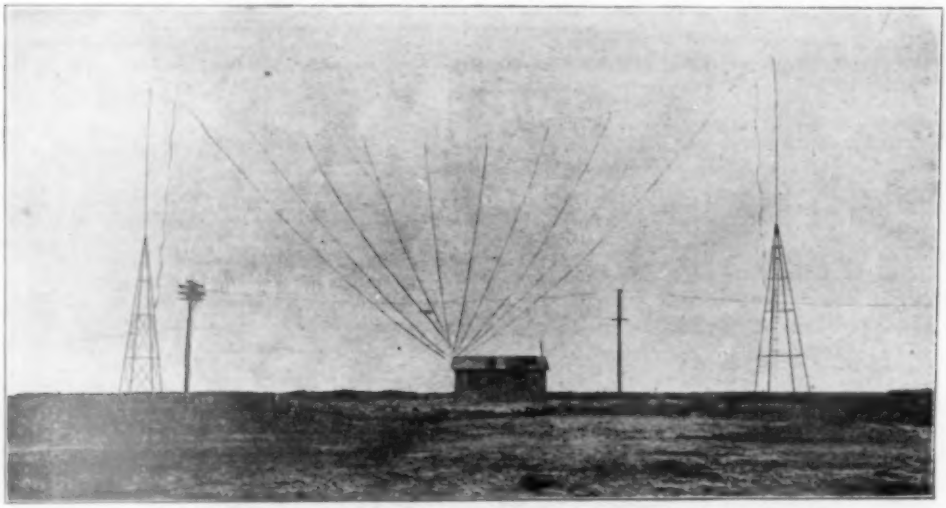
The aerial is 95 feet high, over all, the towers being of steel, 50 feet high, and the masts being also of steel, 45 feet in height. The towers are 150 feet apart, the ten wires composing the antenna being spaced equally within this distance, in the well-known vertical fan fashion. The aerial wires are 7 strand No. 22 tinned copper wire, the top cable being 7 strand No. 18 phosphor bronze, with three 10½ inch Electrose insulators at each end. The loose end wire attached to the tower sides of the insulators are to provide downhauls

for the cable should the aerial give way.

The ground system of the station is perhaps one of the principal reasons for its success. It is composed of two banks of wires, one consisting of 20 wires (No. 14 bare copper) each 30 feet long, buried radially from the station, and the other consisting of 8 wires (7 strand No. 22 copper) each 150 feet long, buried similarly. In addition, two wires, each 100 feet long are submerged in the lake, and a number of 6 foot rods are driven into the ground about the station.

Power is provided by a 4 K.W. special power line, shown in the illustration. Telephone is also provided, the number being Sunnyside 10153.

Hy-Rad rotary gap. The rotary gap is contained within a double walled padded box, just behind the marble panel, on which are mounted the radiation ammeter, power variation switch, power ammeter and main switch, the transformer being directly beneath the gap box. The oil condenser is immediately to the right of the switchboard, and consists of 1200 square inches of tinfoil separated by ⅜ inch plate glass immersed in transformer oil. The oscillation transformer is made of 1" x ⅛" brass ribbon and is mounted as shown. The full condenser is used for the 425 meter wave, but only a part is used on 200 meters, the amount being such that only one turn of inductance is used



The receiver consists of a Chicago Radio Laboratory Paragon RA-6 short wave regenerative receiver and Amplifigon type AGN-2 audion control and two step amplifier. An Audiotron tube is used for detector, Western Electric VT-1's or Marconi VT's being used as amplifiers. With this receiver are used Baldwin Mica Diaphragm headphones. Practically all the long distance amateur stations are heard with the phones on the table on average nights; many, such as 2CS, 2ZS, 5AF, 8AA, 8ER, 9BT, 9BR, etc., being generally heard at distances up to 100 feet from the headphones. Six hundred meter stations are heard similarly. At present no set is provided for longer waves than 600 meters, but an undamped wave receiver is under construction.

The transmitter consists of a Marconi (United W.T.Co.,) open core 1 K.W. transformer, having a secondary voltage of 30,000, with an oil immersed plate glass condenser, and a Chicago Radio Laboratory

in the primary on this wave.

Because of the high fundamental wave length of the aerial (300 meters) all 200 meter transmission and reception are done through series condensers, the transmitting series condenser consisting of 175 square inches of tin foil separated by ⅜" plate glass and immersed in oil. This condenser is located just above the loader, which is used for 425 and 600 meter waves.

The radiation on 200 meters is 8¾ amperes, and on 425 meters is 9 amperes, the 425 being really better than would appear from a direct comparison of these readings, because of the elimination of the series condenser, and also because of the greater carrying ability of this wave.

The 200 meter wave is used ordinarily, with a shift to 425 to avoid interference or to work over greater than average distances. The answering wave of this station is invariably 200 meters, unless otherwise specified by the calling station.

(Concluded on page 35)

Radio Communications by the Amateurs

The Publishers of QST assume no responsibility for the statements made herein by correspondents.

AN EASILY CONSTRUCTED REGENERATIVE SET

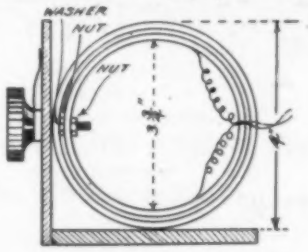
MR. Clarence F. Bates, of Milwaukee, Assistant A.R.R.L. District Superintendent for Southern Wisconsin, in a letter to "Eddy" describes a short-wave receiver which that same "Eddy" believes will appeal to a lot of QST folks. It is easy to make, and it works, but we will let Mr. Bates tell about it in his own words:

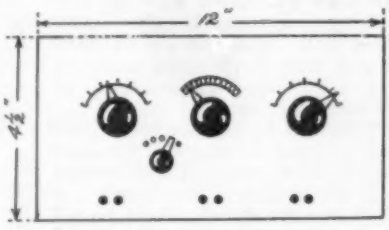
"I made a little 200 meter set the other day that worked so good that I just have to tell the rest of the fellows about it. I conceived the idea at 9 a.m., went down town and bought the necessary junk, made the set and had it working at 5 p.m.! Oh, Boy! Stuff just naturally busted in right off the bat!

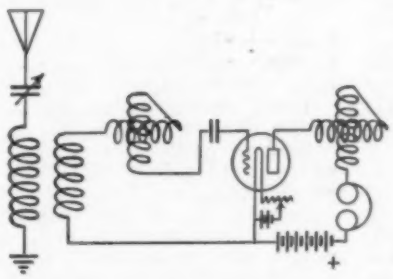
Now here's the dope: First cut three card-board tubes 4" in diameter, and 1¼" wide, and three tubes 3¾" in diameter and the same width as the other ones. (I used a small Quaker Oats box for the large size and a Gold Medal Powdered Sugar box for the small ones.) Drill holes exactly in the centers of all the tubes, and wind 24 turns of No. 26 double cotton covered wire on each tube, (12 turns to a side, leaving ¼" space in the middle) and be sure and wind 'em all the same direction. These are going to be variometers when we get thru with 'em, so don't be imagining all kinds of 'foney' hook-ups. We will use one pair (large and small tube) for the grid variometer, another pair for the loose coupler, and the other pair for the plate variometer (apologies to Paragon and Grebe). These can be mounted in any way convenient to the builder, but I mounted mine as per accompanying diagram. You can use either taps in the primary or a series variable condenser. The hook-up is shown, and believe me, fellows, it sure does work! With proper adjustment of the nuts and washer on the shaft of the knob, the outside tube will be held firm against the panel and the inside one will turn nicely.

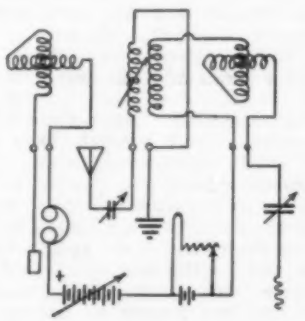
Well, fellows, I wish you the best of luck. CUL 73 SK."

(Note: To avoid inductive effects it would be better if the loose-coupler were not in the same plane as the variometers. Consequently we suggest that it be wound on a tube mounted with its axis vertical, and of such height that the shaft of the secondary can be mounted in line with the variometer shafts.—Eddy.)









MISSISSIPPI VALLEY DOPE

Johnny Clayton, East Gulf Division Assistant Manager, formerly 5BV and now 5AF of Little Rock, Ark., and a personal friend of the Editor's, writes a letter containing so much of real news concerning operation down old Trunk Line E that the Editor has decided to publish it, eliminating a few purely personal paragraphs, and knows the Old Guard will read it with interest.

1301 Welch St.,
November 20, 1919.

My dear Warner:

I have been intending writing you a nice long old "hammy" letter for some time, but the good wireless weather has started up at last and have been rushing like everything to keep the hook cleared off. OM I sure wish you were down at FW again. My me, but you did roar in in those old days long gone by.

Stuff coming in pretty good—weather awfully crazy tho. Can't count on holding tngs over on hook over night as most likely the next nite will be bummer than summer! Consequently have to do some tall rushing to keep 'er clear.

Miss 9ABD like everything—however 9JW takes his place fairly well. He, 9JW, comes in just about like 9ABD used to. Remember 9JW used to have one of those NG 500,000 cycle rotaries? Well I think he has been perusing QST, and decided to come down to about 120;hi! Anyway, his tone like 9ABD exactly and he seems to come in QSA-er and steadier.

Matty fairly tears the roof off on fair nites. Comes in 3 times as QSA and regular as he used to. New 9AU at Chi does same thing. Bunch at St. Louis coming in good too. But there's so darn many of 'em and they don't seem to try to regulate local QRM that fat chance of doing any dx work wi 'em.

The new fellow LF at Roswell, New Mexico comes in good as any of 'em, and can hear him on nites when I can't even hear the St. Louis gang! OM, there's our main chance to wk the Pacific. He hasn't done it yet, but reports tt he has wkd 1100 miles already and the good weather hasn't come in good yet. He will be ideal for that work—closer than 6DM was, closer to us I mean and abt same distance to Pacific.

Traffic pouring thru. Have done 42 this month already. Can't wk but three hours nite acct QRT agreement with the 2 thousand spark locals.

Have put in application for special license. Hope can get it as I sure need it.

OB I sure do wish the old gang—9ABD, 9GY, 9NN, you an the rest of the old "has wuzzes" were back here. This bunch on nw is OK but not nearly as snappy and short as the dear old bunch we used to QRM wi so much in ye olden days.

By the by if you hear of my sigs busting thru up that way for Gawds sake have the guy who gets me write me, or better still u gv the info second handed. See, OM am still a ham when it comes to seeing how my sigs come thru."

THIS LOOKS LIKE RECORD RECEPTION.

Deering, N. Dak.,

Editor, Q.S.T.,

In your "Strays" of last month's Q.S.T. you told about the CW set on the U.S.S. George Washington on its first trip with the President.

On July 4th, last, I heard the wireless telephone conversation carried on between this ship and New Brunswick, N. J. Their voices were loud and clear and in spite of the fact that the ship was far at sea both came in about the same. Their wave was about 8000 meters I think. The ship's members sang songs, among some were, "K—K—K—aty","There's a Long, Long Trail", "Beautiful Ohio", etc. The conversation also dealt with the R-34, the British Airship. I also heard them the next day but the static was so severe that nothing could be made out.

Could you please tell me what power they were using and what type of C.W. sets they were using, also if you heard of anyone else hearing them.

If I am not mistaken they were using two tubes according to articles in different papers. If they were, they certainly made a "distance" with low power!

With best wishes to Q.S.T. and the A.R.R.L., I am,

Sincerely yours,
James B. Corum.

CIRCUIT WIZZES, STEP FORWARD!

East Orange, N. J.

Editor QST:

That article entitled, "Some Dope On Hook-ups", on page 10 of the November issue of Q.S.T., was mighty interesting.

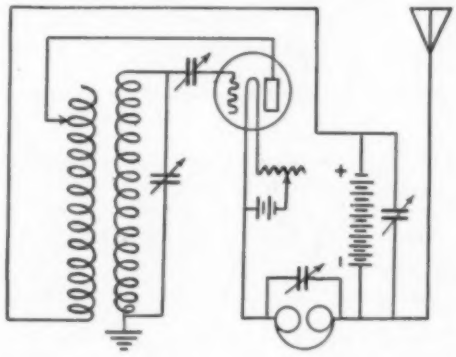
The idea of employing the primary of a loose coupler as a tickler has been tried by the writer on very numerous occasions with varying degrees of success.

I find that by using the hook-up shown in the enclosed sketch, the audion can be caused to oscillate over the entire range of the coupler, IRRESPECTIVE of the size of the coupler. The grid condenser can, of course, be of fixed capacity, but if a variable condenser is used, much better results will be obtained.

Although I do not pretend to understand HOW this hook-up functions, still the fact

remains, never-the-less, that it DOES function and functions admirably.

Might advise, though, that with this particular hook-up the "antennae" that I use is nothing more nor less than a wire soldered onto the tin gutter that surrounds



my residence. When a battery of 95 volts is connected in series between my ground and "aerial" I find a leak of a little over 3 volts.

Wishing Q.S.T. abundant success, I am,

Yours very truly,

George N. Garrison, I.S.R.

WINSER HEARD FROM.

Our Pacific Coast bunch, in particular, will be glad to hear from Mr. Winser, who was formerly QST's Western Correspondent. We're outtaluck, as VN says, in hoping for Winser again, but perhaps some other scout around Frisco with a facile pen would like to undertake it?

U. S. Naval Radio Station,
Wailupe, Honolulu, Oahu, T. H.,
November 2, 1919.

Dear Mr. Warner:

Yours of October eighth to hand, forwarded from home address, and I wish I were in a position to do something in the line you suggest, but as you will note, I am considerably farther west at present than you had imagined, in fact so much so that I am effectively removed from any amateur activity, other than that of deep interest in all things amateur, and particularly in the doings of the A.R.R.L.

However, though I am not now an amateur, I still claim to be a relayer and to rate my membership in the League, for this station is the busiest little relay station in the world today, with an average of close to ten thousand words handled by radio every day—a record that will make our champion League stations look to their laurels!

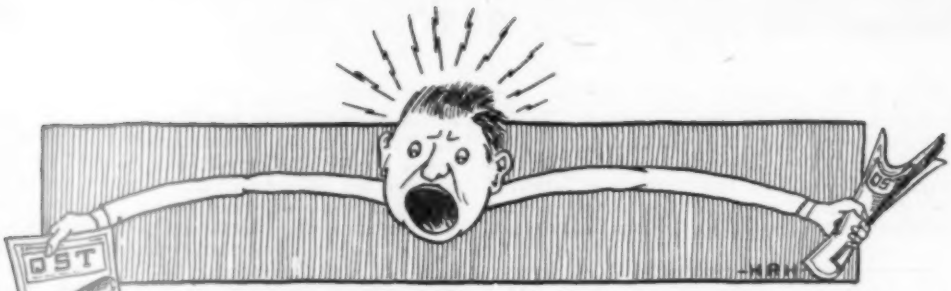
The explanation of this huge volume of business is that we are the relay point for all Trans-Pacific commercial and Government radio traffic, besides handling all originating at, and destined for Honolulu, which is put on land wire between the station and city office, and also the inter-island and ship-to-shore business, taken care of by the spark set. For Trans-Pacific work we maintain twenty-four hour per day communication with San Francisco and definite schedule periods with San Diego, Funabashi (Japan), Cavite (Philippines), Guam, and Tutuila (Samoa). To accomplish the necessary simultaneous reception that the filling of all these schedules requires there are five separate receiving sets and antennae and two arc stations for handling the transmission, both remote controlled from this station so that we can receive with the arcs running. One of these arcs is only moderate power and can only be used at certain periods when conditions are favorable so that it often happens that three operators are using the same arc in turn for giving their "breaks" and corrections and sending to one station or another. No doubt the fellows in the States who listen up on the long waves often think that "NPM" is crazy when we begin to pull some of our "multiple interacting duplex" stuff. Believe me, there is a splendid opportunity for the "Old Man" to give us an article on "Rotten Complicated" when three or four of us get tangled up in a scramble for that one arc.

Regarding our receiving equipment, it consists of Navy Standard long wave receivers with audion control cabinets and two step audio frequency amplifiers and we use loop antennae exclusively except for spark and short wave arcs (ship arcs etc). These loops are about twenty-five feet high by a hundred long with sixteen turns and give good signals with the two steps. The static is by no means eliminated with the loops but the signal to static ratio seems to be greatly improved, and it is possible to work right through nearby thunder storms that would make things too hot for a set hooked to a high grounded antenna.

I came over here about two months ago on a Shipping Board 8,800 ton steel steamer, the West Keene, and you may imagine my surprise when I boarded her in San Francisco to find Fred Roebuck, ex 6FD of Phoenix, Arizona, in charge of the fine new 2 KW Lowenstein aboard. We certainly had one fine trip, and lived up to our reputations as relayers by acting as a clearing house for coast business from ships further out (and some not so far out for that matter) on nearly every night up to 1700 miles.

Most sincerely yours,

Lindley Winser.



QST SUBSCRIPTION CONTEST

BULLETIN

The standing of those Contestants who have sent in Credits was as follows on December 10th.

E. Garratt Arnold, San Jose, Calif.	12
John W. Day, Newton Upper Falls, Mass.	24
Oscar L. Davis, N. Y. City	24
Harold Demmer, Ellendale, N. Dak.	12
Robt. H. K. Foster, Columbus,, Ohio	60
Harry Fass, Plainfield, N. J.	12
E. C. Gardiner, Brooklyn, N. Y.	36
Omar J. Humphrey, Seattle, Wash.	24
Kenneth E. Hiorns, Librarian, Attleboro, Mass.	36
Thomas F. Hunter, Elizabeth, N. J.	60
R. D. McCommon, E. Palestine, Ohio	120
Herbert C. Midgely, Stapleton, N. Y.	24
Dwight Myer, Chicago, Ill.	12
Progressive Radio Assoc., Chicago, Ill.	12
Herbert Richter, Collegeville, Minn.	60
H. E. Welch, Salem, Oreg.	12
Paul Zeyn, Weehawken, N. J.	12

Because it costs so much money nowadays to print a magazine that every square inch of space is needed for relay dope, I am not this month publishing the names of the many fellows who are entered and who are hard at work but who haven't turned in the result of their labors. There are another hundred of these, and a bunch of dark horses among them I know. This makes the present actual standing uncertain, because they're holding out on me, but it adds to the excitement. I know they're holding out, for several have admitted they had a dozen or so subs lined up when they enrolled.

Are you entered in this Contest? See my spiel in the November and December numbers. QST is going to give away a whole raft of the highest quality amateur apparatus, the best in America—just for a little work in getting subscriptions. Altho a month has elapsed since the Contest started, it runs until February 10th, so there is still time for you to get in and make history, if you are a hustler. Write to me.

The time is shortening up and the easy stuff is being rapidly garnered in. Now we're getting down to systematic plugging, where hard work is what is going to count. Its worth it, tho, fellows. Good apparatus costs money these days, and no easier way of getting it was ever offered than the proposition of signing up your friends for QST. We would hate to mention the number that have promised us they would get the First Prize. We can't make any prophesies, but I don't hesitate to say that the hard workers will win the prizes. The sooner you get started, the more chance you stand of winning. "Well begun is half done". Make your beginning now, and start piling up "safety factor" for the fast work at the end of the contest.

Mr. Hunter enters the Contest with the following "pome".

I am the wandering Ham.
I know no home, I know no roost.
To me each knock is one more boost.
I'm optimistic, not a grouch.
In all crepe-hanging I'm a slouch.
I, the Wandering Ham.

Since our Fathers raised the ban
I oscillate where'er I can.
I tried each mineral years ago
In the days of AX and GO
And Galilee and Manhattan Beach.
I jammed the "cans" on, hearing each
And every station in my zone,
And untuned ships upon the foam.
I, the Wandering Ham.

Then came the war, the blood, the strife.
The ban was on, it seemed for life.
My "civvy" clothes I laid away
And to the transport, sans delay,
I made my exit from this shore
To ask Fate what She had in store
For one, a pounder of the "brass"
(In Continental I could pass)

Along the lines, where papers told
Our boys were lying, many cold
In Death. Determined this should be
A world safe for Democracy
I took my post in a little hut
With smelly oil-stove, full of soot,
To intercept, with bated breath,
The Signals through the lines of Death
From stations of the Enemy.
(What rotten Hams them Germans be.)
Deciphered, these would give the dope
On Enemy movements and, we hope,
Forestall an unforseen advance
And give our men a fighting chance.
One night, (November, t'was the tenth)
A message sent throughout the length
Of France and Germany to say
An Armistice, the following day
Would be declared, did find it's way
To my antenna from Eiffel Tower;
"Lay down your arms at the eleventh hour."
I shouted not, nor did I sing.
I did a very awkward thing.
I could not spit upon the cat,
So I used the spittoon for a hat.
I, the Wandering Ham.

You've read this stuff. You want to know
Just what I'm after, so let's go.
Kindly send me, here's my thanks,
A flock of Contest Subscription blanks.
I have already near a score,
And hope to raise a hundred more
Subscriptions to your pamphlet bright,
Q S T—The Hams delight.
I know no Ham with bean so dense,
He cannot see his fifteen cents
Is wisely spent. Success, I sing,
Be yours, in spite of everything.
I, the Wandering Ham.

If he can sing a swan-song like that to his prospects, he ought to come out near the top, eh what?

Well, to work now, and good luck!

THE CONTEST MANAGER.

CALLS HEARD

They're coming in, fellows, like we said—faster than we can print them. Keep it up. But please give us a lift. It takes us an awfully long time to re-arrange the calls in shape for printing, but if each man will do his part it will be easy all around. The Editor asks your co-operation in the following:

(1) All lists should be in by the 1st of the month, for publication in the succeeding QST.

(2) Please arrange the calls by districts, from 1 to 9, and alphabetically thru each district.

(3) If desired, put parentheses around the calls of stations who were also worked—a system which has been observed below.

(4) No cognizance taken of initial or other unauthorized calls, so please omit them.

(5) List only calls over 100 miles from you.

A word to you fellows whose sparks are being heard constantly but who are not in regular relay work: Why not get lined up and have a place in A.R.R.L. traffic? The Secretary will be pleased to send you a membership application blank and information about getting in on the relay activities.

HEARD AT 1AW.

Heard at Mr. Maxim's station (Maxim and Warner, operators), Hartford, Conn.

1AM, (1AN), (1AP), 1AQ, 1AS, (1AU), (1AZ), 1BZ, (1CM), (1CZ), (1EN), 1EP, (1FQ), 1GK, (1IW), 1JN, (1KT), (1MP), (1NO), 1RT, 1ZV, 2CC, 2CS, 2CZ, (2DA), (2IR), (2JN), (2JU), 2YK, 2YM, 2ZL, (2ZM), (2ZS), (2ZV), (3AN), (3AK), (3BZ), (3CC), 3CE, 3CV, 3ES, 4BY, (8AA), (8AD), 8AH, (8ADX), 8AMN, (8AUM), (8ALE), 8CB, (8CC), 8CH, (8DA), 8DG, 8DR, 8DU, 8DV, 8ED, (8ER), 8EX, 8FP, (8FR), 8FZ, 8GP, (8JZ), (8NH), 8NF, (8LE), (8ZX), 9AJ, (9AS), 9AU, 9BR, 9CA, 9VY, (9ZN).

HEARD AT 5AF, LITTLE ROCK, ARK.

(3BZ), (4AA), 4BC, 5AA, (5AC), 5AD, (5AG), (5AL), 5AP, (5AQ), (5AS), (5AU), (5BB), 5BL, 5BO, 5BP, 5BR, 5DO, (8AA), 8AE, 8ADX, 8DC, (8AHI), (8ASG), (8JZ), (8NF), 8CB, 8LS, 8CD, 8FR, 8VP, 8AMN, 8ER, 8EX, 8EZ, 8FI, 8EC, 9VF, (9HN), (9JW), (9AJ), 9FH, (9AU), 9HU, (9PO), (9ZN), (9AP), 9NH, 9XR, (9BR), 9NE, (9VP), (9DC), (9BT), 9HT, 9SC, 9AD, 9DC, 9WH, 9ANO, 9AAW, 9EE, 9BM, (9MK), 9CA, 9AHW, (9VY), 9KY, 9PF, 9AOB, 9CE, 9WU, 9DK, 9WW.

HEARD AT 2ZS, YONKERS, N. Y.

1AW, 1AS, 1CM, 1FQ, 1ED, 1RN, 3AN, 3CC, 3BZ, 4AA, 5AF, 8AA, 8AD, 8ADX, 8BL, 8CC, 8FR, 8LE, 8QW, 9AD, 9AU, 9CE, 8HN, 9JW, 9VP, 9VY, 9ZN.

HEARD AT CANADIAN 3AB

(3AB is Mr. Keith Russell, Toronto, Ontario. Good work, 5AF!) 1AW, 2ZS, 3BZ, 5AF, 8AA, 8AD, 8AUM, 8EX, 8JZ, 8ZX, 9AU, 9SK, 9SX, 9VY, 9ZN.

HEARD AT 9ZN, CHICAGO

(1AW), (2CS), (2ZS), (2WB), 2WU, (2ZV), 2DA, (2JU), (2BM), 3AN, (5AF), (5AC), (8AA), (8XU), (8NN), (8JZ), (8ADX), (8NF), 8CB, (8FR), (8AAZ), 8AU, (8AMN), (8ASG), (8AUM), (8XK), (9BT), (9AJ), (9OY), (9ST), (9BR), (9VP), (9NE), 9DC, 9PO, (9HU), 9CA, (9AP), 9ANO, (9CS), (9SZ), (9MK), 9JO, 9JL, 9VY.

HEARD AT 3BZ, DANVILLE, VA.

1AW, 1CM, 1DA, 2ZM, 2IR, 2LM, 2AAN, 2CS, 2CH, 2DA, 2JU, 2BB, 2ZS, 2BM, 2WB, 2BA, 3AN, 4AA, 5AC, 5AF, 8LT, 8AHI, 8LS, 8AA, 8NF, 8AU, 8NH, 8AUM 8JZ, 8ADX, 8LB, 8CC, 8BR, 8CH, 8CB, 8ASG, 8AMN, 8FR, 8AM, 9AJ, 9ZN, 9VP, 9BR, 9JM, 9YI, 9AIK, 9VF, 9ZR, 9CA, 9PC, 9VY, 9VC.

HEARD AT 8AA, DEFIANCE, OHIO
(1AW), 2AIN, (2BM), (2CS), (2DA), (2IR), 2JU, (2WB), 2ZA, (2ZS), (3BZ), (5AF), 5AL, 5AC, 8APK, 8AU, (8AM), (8AMN), (8ADX), (AUM), (8CC), (8NN), 8NA, 8GR, (8JZ), 8LS, 8XU, (9AD), 9ADB, 9AH, (9AJ), 9AP, (9AU), 9AKT, 9BP, (9BR), (9BT), (9CA), 9CD, 9CR, (9CS), (9DC), (9DL), 9EE, (9FH), (9MK), 9JL, (9NE), (9PO), 9PQ, (9VP), (9ZN).

HEARD AT CHATHAM, MASS.
By R. J. Iversen, old 9AU of pre-war days, now operating at the Marconi transatlantic station: 2AA, 2BB, 2BK, 2BM, 2DA, 2JN, 2JU, 2IR, 2LO, 2CS, 2SH, 2WB, 2YM, 2ZS, 2ZM, 2ZL, 2ZV, 3AA, 3AF, 3AK, 3AN, 3BA, 3BZ, 3CC, 3CS, 3CE, 3CZ, 8AA, 8AH, 8CC, 8DA, 8MC, 8NH, 8AUM, 8ED, 9AU, 9ANO, 9ZN.

HEARD AT 8CB, HIGHLAND PARK, DETROIT
1AW, 2BM, 2CS, 2JU, 2LO, 2WB, 2ZS, 3AN, 3BZ, 4AA, 4BZ, 5AF, 8AA, 8AB, 8BA, 8CC, 8CN, 8DA, 8DG, 8EX, 8FO, 8NF, 8JZ, 8YC, 8XU, 9AP, 9AU, 9AJ, 9BO, 9BT, 9BR, 9CR, 9CA, 9HN, 9JW, 9MK, 9UP, 9ZN.

HEARD AT 8DA, SALEM, OHIO.
(1AW), (2ZM), (2ZS), 5AF, 5BV, 9AJ, 9AU, 9HN, 9JW, (9ZN).

WORKED BY 9BR, ST. LOUIS, MO.
2ZS, 4AA, 5AC, 5AF, 5AG, 5AQ, 8AA, 8AH, 8JZ, 8NH, 9AJ, 9AP, 9AU, 9BT, 9CA, 9CS, 9EE, 9NE, 9PQ, 9ZN. Also heard 5BP, 5AL, 8AMN, 8FI, 8FP, 9ANO, 9MK, 9NH, 9AIK, 9FI.

HEARD BY LEE A. BATES, WORCESTER, MASS.
1AN, 1AY, 1DC, 1GB, 2DA, 2GA, 2JU, 2YM, 2ZM, 2ZS, 2ZV, 8AA, 8NS, 9ZN.

HEARD AT LXA, R. H. Pray, VALLEY CITY, N. D.
5AF 5DO, 8AA, 8ADX, 8AMN, 8DA, 8ER, 8JZ, 8NF, 9AJ, 9AU, 9ANO, 9AP, 9AHW, 9BR, 9BT, 9BU, 9CS, 9CH, 9CO, 9DN, 9FI, 9HU, 9JL, 9MK, 9NE, 9NM, 9MC, 9PQ, 9UP, 9VQ, 9WF, 9WH, 9XN, 9XR, 9YI, 9ZN.

HEARD AT 6BS, SAN FRANCISCO
6AV, 6BR, 6EA, 6TX, 7MC.

HEARD BY EX-8NF, BATTLE CREEK, MICH.
1AR, 2JU, 2ZM, 3AW, 3ZS, 4BC, 4ZI, 5EP, 8AH, 8LE, 9DR, 9UP, 9VY, 8XT, Worked with 5AF, 8AA, 8ER, 8JZ, 9CA, 9AU.

COPIED AT 8DZ, VAN WERT, OHIO.
1AS, 1AW, 2BZ, 2CS, 2DA, 2IR, 2WB, 2ZM, 2ZS, 3BJ, 3DW, 4AA, 4AC, 5AF, 5AU, 5BV, 8AA, 8AMP, 8AUM, 8BK, 8NH, 8JZ, 8VA, 8XU, 9AJ, 9AN, 9AO, 9AMO, 9BG, 9BR, 9HN, 9JW, 9LN, 9PW, 9KF, 9QA, 9VF, 9VP, 9VH, 9PF, 9ZN, 9VY.

HEARD AT 5BR, MUSKOGEE, OKLA.
4BY, 5AC, 5AF, 8EX, 8EZ, 9AK, 9AJ, 9AP, 9BN, 9CS, 9DC, 9GO, 9GR, 9IP, 9NE, 9PF, 9PO, 9YD.

AT EX-8ASG, DEFIANCE, OHIO.
1AS, (2WB), 2ZS, (3BZ), (5AF), 8MC, 8XU, 9AJ, 9ANO, 9BU, 9AU, 9HN, (9NE), 9MK, 9RD, 9PO, 9JW, 9ZN. Ex-8ASG is Geo. D. Howsare, Room 12, Sisson Hall, Defiance, and has been signing DC. QRK?

HEARD AT 9AP, CHAMPAIGN, ILLS.
2CS, 2ZM, 2ZS, 4AA, 5AF, 5AL, 8AA, 8JA, 8NF, 9AJ, 9AU, 8ASQ, 9BR, 9BT, 9CS, 9VP, 9ZN.

HEARD AT 1AN, M.I.T., CAMBRIDGE, MASS.
(1AW), 1CM, (2JU), (2DA), (2ZS), 8DA.

HEARD BY OLD 9VY, FT. WAYNE, IND.
1AG, 1AW, 2DA, 2JU, 2ZS, 5AC, 5AF, 8AA, 8AUM, 8CC, 8DA, 8EZ, 8JZ, 9AJY, 9AOC, 9AU, 9AP, 9ANO, 9BR, 9BT, 9CT, 9CS, 9NE, 9PF, 9PQ, 9SX, 9VP, 9ZN.

HEARD BY G. R. HAMMOND, OELWEIN, IOWA.
5AF, 8EX, 9AJ, 9AU, 9BP, 9BR, 9BT, 9PF, 9ZN.

WORKED BY 5AG, HOUSE, TEX.
5AF, 9NE, 9VC.

HEARD AT EX-9ADL, MILWAUKEE, WIS.
1AW, 2BM, 2DA, 2IR, 2JZ, 2SH, 2WB, 2ZS, 3AN, 3BZ, 3RS, 3AMO, 5AF, 5AQ, 8AA, 8AV, 8CB, 8CC, 8DA, 8DO, 8DW, 8EC, 8EF, 8EH, 8ER, 8EX, 8EZ, 8FC, 8FI, 8FL, 8FN, 8FP, 8JZ, 8LS, 8UG, 8ADK, 8ADX, 8APK, 9AJ, 9AP, 9AU, 9BT, 9CA, 9CE, 9CS, 9HN, 9MK, 9QA, 9UK, 9ZN, 9NE.

HEARD AT 1BG, MELROSE, MASS.
2BO, 2BK, 2BM, 2DA, 2JU, 2ZL, 2ZM, 2ZV, 3AK, 3CC, 8AA, 8ADX, 8AD, 8AL, 8ALE, 8CB, 8CC, 8DA, 8EC, 8ER, 8EX, 8EZ, 8GQ, 8HQ, 8JZ, 8LC, 9AJ, 9AU.

HEARD BY 8AD, BUFFALO, N. Y.
1AW, 2ZL, 2ZF, 2ZV, 5DU, 8AA, 8AHI, 8NH, 8FR, 9AD, 9AF, 9ADX, 9FP, 9ZN.

HEARD BY 2BM, HUDSON, N. Y.
1AS, 2DA, 2JU, 2XA, 8AA.

REPORTED BY C. B. WEED, NEW HAVEN, CONN.
1AN, 1CM, 2DA, 2JU, 3AK, 8AA, 8CC, 8NH.

HEARD AT EX-9ALW, AMES, IOWA.
5AC, 5AF, 6EX, (8AA), 8EA, 9AU, 9AKQ, 9AIK, 9AJ, (9BR), 9BT, 9CS, 9NE, (9PF), 9PQ, 9RB, (9VP), 9WH.

HEARD ON LAKE MICHIGAN
Aboard Str. Pere Marquette 20 (WDE) by J. A. Goorisich, Ex-9KF, of Chicago, December 7th and 8th, about 180 miles north of Chicago: 2ZM, 5AF, 5AS, 8AA, 8AH, 8AMN, 8LB, 8CS, 8DA, 8ER, 8EX, 8FS, 8GC, 8GY, 8LS, 8NF, 9BT, 9CA, 9CS, 9DC, 9NE, 9PC, 9PF, 9PQ, 9VP, 9WH, 9ZN.

HEARD BY K. K. KRAMER, VIRGINIA BEACH, VA.
1AN, 1AW, 1CM, 2BB, 2DA, 2JU, 2ZM, 2ZS, 2ZV, 3CC, 3ZS, 8AA, 8JZ, 8AUM.

HEARD BY 2MX, SLINGERLANDS, N. Y.
1AW, 2AN, 2BM, 2DA, 2LO, 2SH, 2WU, 2ZM, 2ZS, 3BZ, 8AA, 8AR, 8DA, 8CC, 8GR, 8NF, 8NR.

HEARD AT 2FG, ALBANY, N. Y.
2BM, 2DA, 2MX, 8AM, 8CB, 8DA, 8NF.

HEARD BY E. W. ZINMASTER, JR., PITTS., PA.
2ZV, 3BZ, 5AF, 8CB, 9ANO.

REPORTED BY 2BK, YONKERS, N. Y.
1AN, 1AS, 1AW, 1CM, 1EA, 1LA, 1YA, 3AN, 3CV, 3KS, 3ZH, 4AA, 8AA, 8AH, 8ANQ, 8AUM, 8CB, 8CC, 8EX, 8FR, 8JZ, 9LQ, 9ZN.

HEARD AT 8DY, BINGHAMTON, N. Y.
1AN, 1AR, 1AW, 1RN, 2BM, 2CS, 2CH, 2DA, 2LO, 2IR, 2PL, 2SH, 2ZM, 2ZS, 2JU, 3AM, 3BZ, 5AF, 8AA, 8AB, 8AO, 8CC, 8AE, 8CB, 8DA, 8DO, 8DW, 8EF, 8ER, 8EX, 8EZ, 8FH, 8FW, 8GQ, 8JS, 8MC, 8HG, 8QV, 8NF, 8TD, 8ADX, 9AD, 9AU, 8AI, 9CH, 9VP, 9WW, 9ZN.

HEARD BY 2JJ, BERGENFIELD, N. J.
1AS, 1AW, 2AB, 2AZ, 2AVF, 2BB, 2CS, 2DA, 2JU, 2JN, 2WB, 2WI, 2WZ, 2YM, 2ZE, 2ZH, 2ZM, 2ZS, 2ZV, 3AN, 3CV, 8AA, 8AHI, 8CC, 8JZ, 8LE, 9VY, 9ZN.

HEARD BY L. E. FURROW, 420 LAKE ST., TROY, OHIO.
1AW, 2DA, 2ZS, 2ZM, 3XC, 3AK, 5AF, 5AC, 5BV, 8AMN, 8CY, 8JZ, 8EC, 8EZ, 8ER, 8EX, 8AA, 8AJ, 8ALE, 8LN, 8CC, 8UP, 8LA, 8FH, 8GQ, 8XU, 8NN, 9AA, 9AJ, 8HU, 9VY, 9AU, 9XR, 9MK, 9FH, 9ADL, 9NE, 9DC, 9PO, 9ZN, 9AK, 9JW. On December 8th heard 3ZH and DA working on CW sets and also on radiophone.

HEARD AT 1FA, WOODFORD, ME.
1EL, 2BM, 2DA, 2ZS.

HEARD AT 8CP, HOLLAND, MICH.
8ER, 9AJ, 9AO, 9CH, 9CS, 9FA, 9HN, 9PO, 9ZN.

"STRAYS"

The many friends of Willis P. Corwin of old 9ABD will be pleased to know that after operating a year and a half in France he has returned to this country and is now back in Jefferson City and hopes to be soon again in the air with the old bunch. Welcome back, OM, and make it snappy.

So many new calls are reported this month that we have decided to publish them separately as a directory supplementing this issue. As usual, QST is ahead of the field.

Get ready, ye New England amateurs, for the second annual banquet of the N. E. A. W. A., to be held the second week in February. More details in February issue. Reservations may be obtained from Mr. W. E. Heckman, 119 Windermere Road, Auburndale, Mass.

We got our AudioTron adapter! It is advertised in this issue.

We wish some of those navy stations would whet up their wave a bit. NAA and NAM are giving Eastern amateurs a lot of QRM on about 250 meters.

RADIO 9ZN

(Concluded from page 28)

The installation of a 3K.W. transmitter of the same type will be effected by about January 1st, for use on 425 meters particularly. No great increase in radiation is anticipated on 200 meters because of the limited condenser it is possible to use on that wave.

Inasmuch as 9ZN has 4 operators, a continuous watch is kept every night between 8 P. M. and 2 A. M., or later if necessary. Very little long distance work can be done, however, prior to 9 P. M., because of local interference. The operators and their personal "sines" are as follows:—

Mathews - - - - - -	WO
Hassel - - - - - - - -	SF
Buck - - - - - - - -	AD
FitzSimons - - - - - -	GJ

Transmitting records to date are as follows:—

East—Boston, Mass., 850 miles.
North—Valley City, No. Dak., 625 miles.
South—Houston, Texas, 950 miles.
Southwest—Roswell, New Mexico, 1100 miles.

These records are communicating ones, and not merely distances over which the station has been heard.

MR. AMATEUR
HIGH FREQUENCY CABLE—(LITZ).
16-3-38 and 16-2-38 D. S. C. Enameled
GREY SEAMLESS CARDBOARD TUBES
Bakelite and rubber panels. Radio Call 1FJ. Write for circular on Honeycomb Coil Mounting —it will interest you. Wholesale and retail.
A. T. HOVEY
61 Belvidere Street, Near Mechanics Bldg., BOSTON, MASS. (Open Evenings)

AERIAL WIRE
7 strands No. 22 pure copper. High tensile strength and 100% Radiation. Shipping weight 15 lbs. per 1000 feet. Postage extra. No C. O. D's. at this low price. Immediate delivery.
1 CENT PER FOOT
$9.00 Per Thousand
GALVANIZED GUY WIRE
7 strands 1/8" diameter 1 cent per foot.
Single wire No. 12 1/2 " " "
LEE A. BATES
8 Moen Street, Worcester, Mass.
Call 1GY—A.R.R.L. Supt., Central Mass.

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Fascinating and Educational Work—Big Salaries—Prepare Now
The United States Shipping Board is making heavy demands upon us for Dodge-trained wireless operators. Travel all over the world, secure, free, unsurpassed living accommodations and earn a big salary.
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School established 45 years. Endorsed by wireless, railway and telegraph officials. Low rates. Students can earn living expenses while attending school. Catalog Free. Write Today.
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SEND 6 CENTS FOR CATALOG

KLAUS Radio Telegraph and Telephone Apparatus
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EUREKA - ILLINOIS

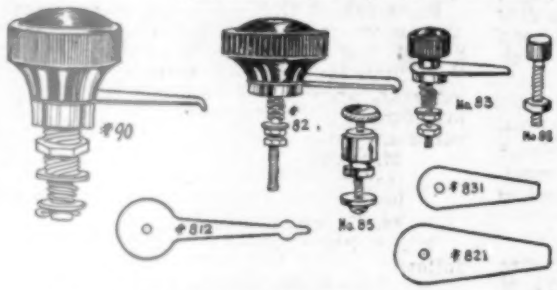
Initial Offering

REMLER RADIO APPARATUS

Highest Quality at Quantity Prices

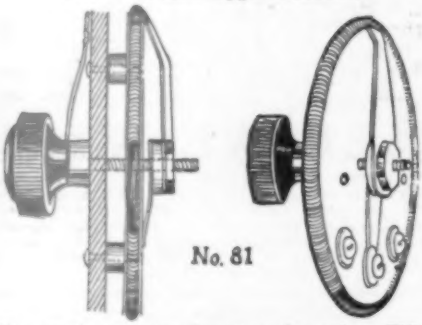
IMMEDIATE SHIPMENTS

Full Line Switches, Levers, Contacts, Binding Posts, etc.



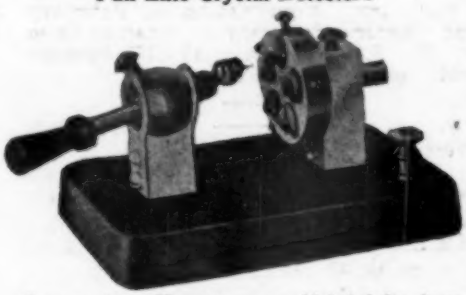
Build your own apparatus and save money. Send for list of parts. ¼" x ¼" or ¼" x ⅛" contacts, ⅜" 6/32 stud and nut. Heavy polished nickel. Each 6c—per dozen 60c. No. 90 switch. Entirely new. Full ¼" steel bearing. Lever pinned on. Can never work loose. Large moulded knob, brass bearing, all metal parts polished nickel. Ideal for couplers, panels, loading coils, etc. Price, $1.25 each

Remler Panel Type Rheostat



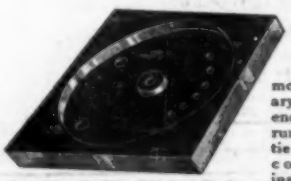
The smoothest running rheostat on the market. Will increase efficiency of your tube control. Resistance mounted on bakelite ring. Unit cheaply renewed. All metal parts nickeled. Complete.....$1.75 each

Full Line Crystal Detectors



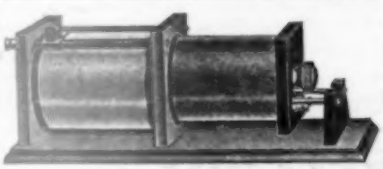
Four models. Mounted on moulded bakelite bases. Prices 95c to $4.00. Cut shows $4.00 model. All metal parts polished nickel. Turret head for 5 crystals. Send for bulletin.

Coupler and Tuner Parts



Complete sets of parts or individual items sold. Save money and build your own apparatus. Cut shows moulded bakelite secondary tuning or loading coil end. Cast in bosses for runner rods, switch and tie rod. Drill marks for contacts and binding posts. Two sizes. 3¾" x 3¾" x ½" to fit 3¼" tubing. Undrilled, 65c each. 4½" x 4½" x ⅝" to fit 3¾" tubing. Marked for 11 contacts, 90c each.

Send for complete parts bulletin.



Complete Line of Couplers

Six different types. Wave lengths 1,500 to 15,000. Full navy and slider types. Parts sold if you want to build your own coupler. Price .....$6.15 to $35.00

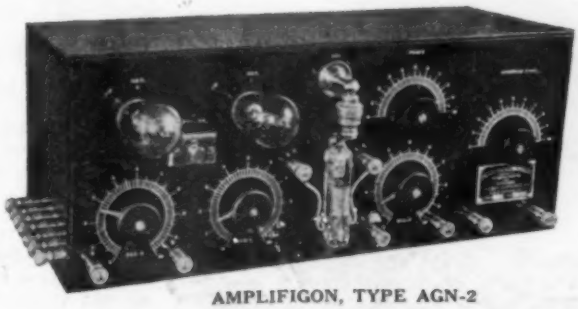
Send for coupler circular

Terms and Guaranty: All our apparatus subject to return and full credit if you are not fully satisfied. That is our confidence in the values we offer. All purchases delivered free when cash accompanies order.

DEALERS:--We want reliable representatives. Send for full details.

REMLER RADIO MFG. CO., 62 Post St., San Francisco, Calif.

Hear 'em All Over The Room!



AMPLIFIGON, TYPE AGN-2

The Chicago Radio Laboratory Amplifigon, shown above, brings in ordinarily faint signals so loud that they can be heard "all over the room". Used at many prominent long distance stations. Made primarily for use with the Paragon regenerative receiver, but can be used equally well with **ANY** tuner or set of tuning devices.

Type AGN-2, as above, comprises detector and EFFICIENT two step amplifier both steps of which actually AMPLIFY, using our famous three-winding amplifier coils. Special circuit employed by which but one "A" and one "B" battery are used for all tubes, **without impairing signal strength.** One step of amplification with our coils is equal to two with the ordinary type.

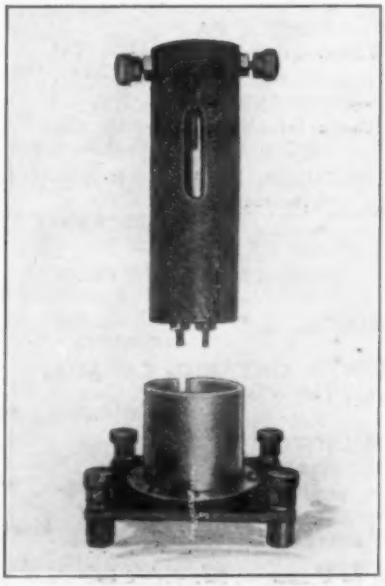
Type AGN-1, detector and one step amp., . . . $60.00
Type AGN-2, detector and two step amp., . . . 90.00

We can also supply Vacuum Tubes.
Our apparatus licensed under DeForest patents Nos. 841,387 and 879,532.
Our new Bulletin J-20 out soon. Watch for it!

CHICAGO RADIO LABORATORY, 1316 Carmen Avenue, Chicago, Ill., U. S. A.

QST AMATEURS!

(PATENT APPLIED FOR)



Send 10c for our catalog.

Here's just what you have been looking for, an adapter that will hold your Audiotron in the standard VT four point sockets.

Every amateur will want one of these adapters, so place your order immediately and be one of the first to add this new convenience to your set.

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We are also distributors for all well known apparatus, including Grebe, Wireless Specialty, Radio Apparatus, Clapp-Eastham, Federal, DeForest and many others of this class.

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RADIO ELECTRIC CO.

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Spread by a Competitor

The Radio Distributing Co. is still manufacturing their unmounted universal wound inductances and will continue to supply their agents these very efficient coils. That the RADISCO COILS are superior to any similar type of inductances is the opinion of several well-known radio men who have received signals from very remote stations.

The RADIO DISTRIBUTING COMPANY will assure all purchasers that they will experience no inconvenience by reason of any action now pending or to be started by reason of patent on coils purchased. These coils are in stock at all RADISCO AGENTS.

RADISCO AGENTS carry only apparatus of proven merit. Look for the RADISCO trade mark on all coils you buy and be sure of getting efficient apparatus.

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BIENVILLE, QUEBEC, CANADA,
Canadian Radio Mfg. Co.

BOSTON, MASS.
Atlantic Radio Co.,
34 Batterymarch St.

BROOKLYN, N. Y.
Kelley & Phillips Electric Co.,
312 Flatbush Ave.

BRONX, NEW YORK CITY,
Amateur Wireless Equipment Co.,
1390 Prospect Ave.

CHICAGO, ILL.
Chicago Radio Laboratories,
1316 Carmen Ave.

McKEESPORT, PA.
K & L Electric Co.
427 Olive St.

NEW CASTLE, PA.
Pennsylvania Wireless Mfg. Co.,
507 Florence Ave.

NEWARK, N. J.
A. H. Corwin & Co.
4 West Park St.

NEW ORLEANS, LA.
L. A. Rose,
4323 Magnolia St.

PITTSBURGH, PA.
The Radio Electric Co.,
4614 Henry St.

PHILADELPHIA, PA.,
Phila. School of Wireless Tel.
Broad & Cherry Sts.

PROVIDENCE, R. I.
Rhode Island Elec. Equip. Co.,
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SPRINGFIELD, MASS.,
Electric Service Co.,
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SCRANTON, PA.
Shotton Radio Mfg. Co.
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TORONTO, ONTARIO, CANADA,
The Vimy Supply Co.,
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If none of the above agencies are in your vicinity, communicate with

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OUR NEW CATALOG H

will save you money on your parts and raw materials. Complete line of high grade apparatus together with our standard switch points knobs, etc. Below are a few of the bargains:

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KNOBS

	EACH	DOZ.
No. 602—1 in. diam., 8/32 bushing	$ .08	$ .85
No. 606—1 1/4 in. diam. 13/16 in. high	.15	1.70
No. 607—2 1/4 in. diam. Like No. 606	.35	3.75

602

626

628

627

SWITCH POINTS

Brass finished, complete with brass screw or brass nut and washer as style requires.

	DOZ.	50	100
No. 626—1/4 in. diam., 3/8 in. high, tapped 6-32	$ .30	$1.00	$1.75
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Nickel plated points 50% advance over above prices. Postage on above extra. Immediate shipments.

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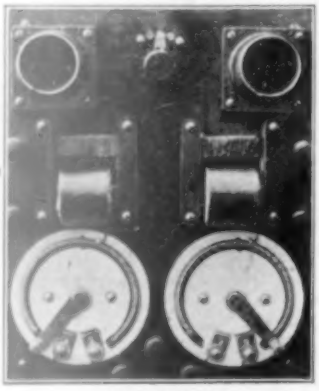
THE ULTIMATE TWO-STEP AMPIFIER



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Lowest Price Highest Quality

ADEQUATE SPACING of tubes and coils eliminates cross talk and squealing.

THE SWITCH between tubes cuts out second step when not needed—permitting economy of "A" battery.

Shipping weight 5 lbs.

New edition Radio Call Book out Jan. 15, $1.00 each.

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Radio Head Set

A set that combines your ideal of extreme sensitiveness with a strong, durable construction that stands the gaff of continuous service ashore or aboard ship.

All operating parts housed in dust-proof and moisture-proof aluminum cases. The diaphragm is mounted metal-to-metal in such a way that temperature variation will not disturb the air-gap adjustments. Non-conducting spool heads and slotted pole tips eliminate 90 per cent of the eddy current losses that are found in other head sets.

Each set is wound to a resistance of 2,000 ohms with pure copper wire and furnished complete with 6-foot moisture-proof cord attached.

Tested for matched diaphragm tuning and operating qualities in actual service before shipment.

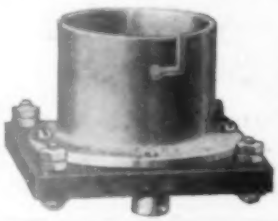
Send $12.00 for sample set for trial in your own station—satisfaction guaranteed or your money refunded upon return of set. Write for Bulletin 1106 giving full particulars.

Stromberg-Carlson Telephone Mfg. Co.

Rochester, N. Y. Chicago., Ill. Kansas City, Mo. Toronto Ont.

"ACE" Vacuum Tube Socket

$1.50 each



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The Ace Vacuum Tube Socket is designed to fit the Standard four prong vacuum tube. The top part consists of a finished aluminum casting, mounted on a formica base ¼ inch thick. This base will not break under any condition of service, as moulded composition bases will. Heavy phosphor bronze springs are mounted on the under side of the base for connection to the tube prongs.

This is the only vacuum tube socket on the market which has the grid leak built in as part of the socket. It may be used for back or front of panel mounting. The best socket on the market regardless of price.

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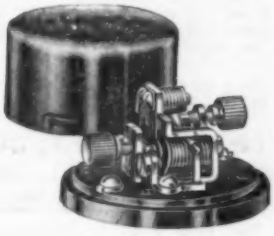
With Shunt Resistance—U. S. Navy and U. S. Army Standard



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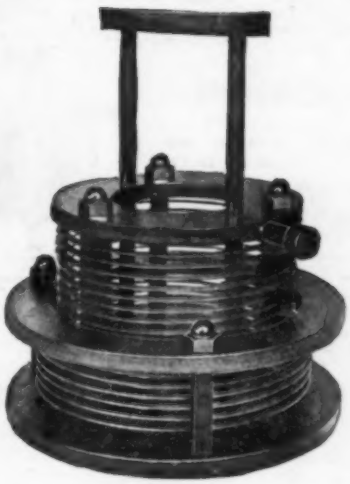

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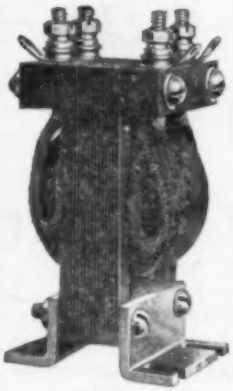

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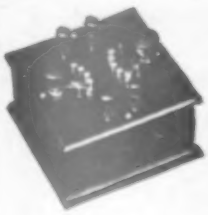

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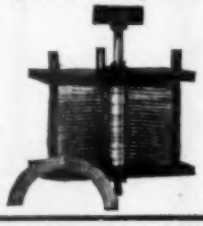

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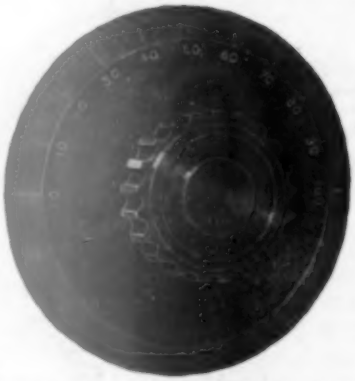

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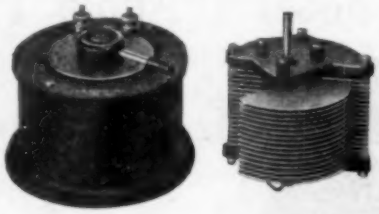

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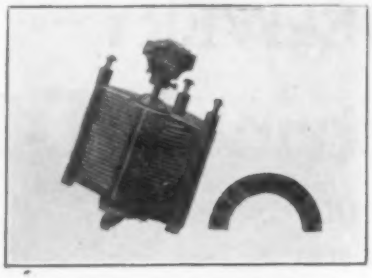

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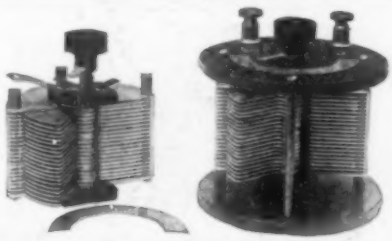

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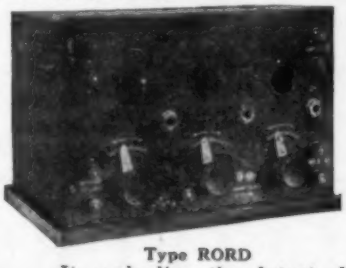

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GREBE RADIO

Vacuum-Tube Detector and

Two-Stage Audio-Frequency Amplifier

It embodies the latest development in Amplifier construction—The Grebe Automatic Control. A telephone jack and plug system controls both the filament and telephone circuits automatically. With the plug in the first jack the Detector only is in use; in the second jack one stage of amplification is added and the output transferred to the telephones. In the third jack the second stage is connected into circuit and the complete unit is in operation.

Amplifier tubes work best at a different B potential than detector tubes. The RORD Amplifier is equipped with two sets of binding posts for B batteries—one for the Detector, the other for the Amplifier tubes.

You will get results from this Amplifier that will surprise you.

Send for free bulletin R-110;—complete catalog 10 cents.

A. H. GREBE & CO., 74 Van Wyck Blvd., Richmond Hill, N. Y.

You Fellows Outfitting Your Long Distance Stations —

Do you know that Baldwin Mica Diaphragm Telephones are many times as sensitive to weak signals as the ordinary 2000-ohm 'phones with iron diaphragms?

And that if you want to get the utmost range from your station you absolutely cannot get along without Baldwins?

Ask any long distance relay man!

The ordinary telephones fail to meet the exacting requirements of long distance radio reception in many ways; Baldwins have been designed to fill this need. In the ordinary form of receiver, the armature or diaphragm is at all times under strain due to the constant pull by the permanent magnet. In our type the armature is under no magnetic strain whatever, until a current flows through the windings—a feature unique in telephone construction. By the employment of a mica diaphragm and a separate light iron armature of small dimensions, the sensitivity is increased enormously—a most important factor in the efficient reception of weak signals.

Four models—types C, D, E, and F—four prices. Write for our interesting literature, and arrange to get your orders in now, for prices will advance January 1st on account of higher costs of material and manufacturing.

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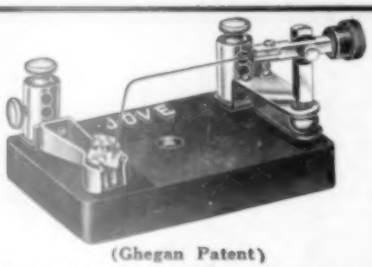

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Tested Galena Crystal 25c.

Bunnell Keys, Transformers, Condensers, Spark-Gaps, Receivers, etc. are High Grade but Inexpensive.

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Send 2-cent stamp for free description of

The Barr Mercury-Cup Detector

The most efficient detector on the market. Tested by The Marconi Wireless Telegraph Co. and the United States Government.

Increases the efficiency of every wireless receiving set by making the signals clear, sharp and distinct.

Instantly adjustable at a constant pressure.

The BARR Mercury-Cup Detector Dept. E, THE WYOMING, WASHINGTON, D. C.

INTRODUCING THE NEW

Arnold Panel-Type Loose Coupler

Dark Oak Cabinet, ¼" Rubber front size 18" x 6" x 6" tunes up to 3,500 meters. All parts protected; matches your panel type control panels, and is chock full of value.

Price, $20.00

Send two cent stamp for literature.

J. F. ARNOLD, **2082 Lexington Ave., N. Y.**

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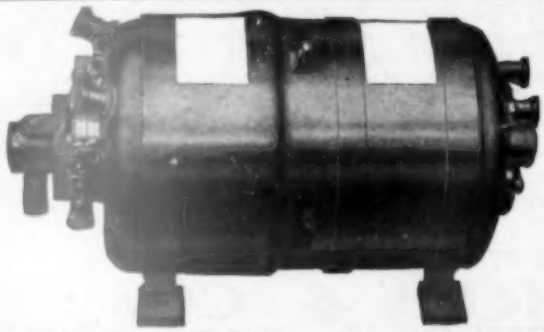

HIGH VOLTAGE D. C. GENERATORS designed especially for use on the amateur radio phone. One of these sets regularly works from New York City to Ohio on 10 WATTS.

GENERATOR—Compound wound to insure constant voltage independent of load. Rated at 350 volts 80 milliamperes direct current, but variable from 200 to 400 volts D. C. On account of its liberal rating may be used at 400 volts 250 milliamperes without undue heating. Commutator has the right number of segments which combined with a speed of 1750 r.p.m. makes for simplicity of commutator filter design and quietness in operation. May be used in apartment houses where quietness is essential.

MOTOR to operate on 110 V. D. C. or 60 cycle A. C. Overall length 11 13/16" and 6" in diameter, weight packed 51 lbs. The only two bearing ball bearing machine on the market; a quality machine built for service and not for price.

Price $70 F.O.B. factory. Write for prices on other sizes and voltages and hear of our other specialties.

MORTON W. STERNS, 129 Wadsworth Ave., NEW YORK CITY

BURGESS "B" BATTERIES

22.5 VOLTS
15 CELLS

THREE SIZES
No. 2156—3" x4" x6 5/8"
No. 5156—2 1/16" x2 9/16" x4 1/16"
No. 4156—2 1/8" x2" x3 3/4"

BURGESS "B" BATTERY construction is being specified by the Government for its vacuum tube batteries. They have long life, high capacity and noiselessness.

Write for prices and information to

BURGESS BATTERY COMPANY

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Madison, Wisconsin

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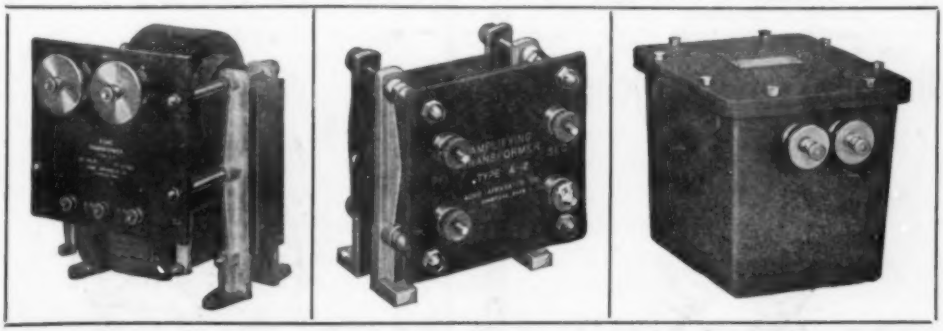
ACME SPECIALTIES



The RADIO and AMPLIFYING TRANSFORMERS have been advertised for several months, and the sale of these popular instruments has severely taxed our factory capacity.

We now call your attention to our OIL CONDENSER, shown at the right, developed to meet the demand of the Amateur who wishes a condenser that will not break down permanently.

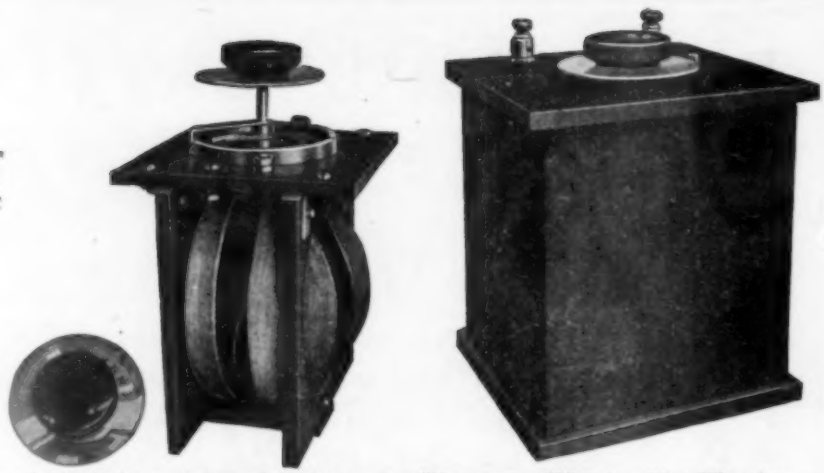
We recommend this condenser for use with our ½ KW transformer, as it is not yet sufficiently developed to hold the potential of our 1KW.

These are carried in stock in two capacities in black crystaline lacquered iron cases, with nickeled fittings.

Type M-2 Oil Condenser .0035 M. F. 12000 volts,—$28.00
Type M-2 Oil Condenser .007 M. F. 10000 volts,—$30.00

ACME APPARATUS CO., 26 Windsor Street, Cambridge, Mass.

A New Variometer for the Amateur



Type S.S. Variometer, in three sizes: maximum inductances, 1 millihenry, 5 millihenries, 20 millihenries. Mounted $20.00; unmounted $16.00.

Variometers provide an inductance as easily and gradually variable as a rotary condenser. They are the ideal inductance; efficient, no poor contacts, dead-end losses or capacity losses from multiple taps.

Clapp-Eastham Variometers are designed to give the amateur a Precision Instrument at a low price. Compact in size and beautiful in workmanship. Especially designed to minimize distributed capacity. Readily adaptable to panel mounting. Equipped with a special drum switch automatically actuated by the control knob, whereby the coils are in parallel the first half revolution providing an inductance continuously variable thru 360 degrees, giving double the range of adjustment available wth other variometers.

Fully described, with other New Developments, in our interesting Bulletin Y.

NEW BULLETIN R OF RECTIFIERS FOR STORAGE BATTERY CHARGING NOW READY.

CLAPP-EASTHAM COMPANY

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REMLER RADIO MFG. CO., 62 Post St., San Francisco, Cal., Pacific Coast Representatives

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"ASK ANYONE WHO HAS USED IT"

"Light and Sensitive. The Mechanical Construction Is Good, and They Look Very Neat." (Name on Request)

This extract from the letter of a satisfied patron, is in line with what they all say.

Brandes Wireless Headset

Superior	Transatlantic Type	Navy Type
2000 ohms, $7	2800 ohms, $10	3200 ohms, $14

TRIAL OFFER *Test out Brandes Wireless Receivers against any other make. Test them for sensitiveness clearness and distance. If within ten days you're not only satisfied but enthusiastic over them — back comes your money without a question.*

Prove for yourself the fine quality, the "matched tone." The two diaphragms, toned exactly alike, strengthen the signals and prevent blurring. Used by many U. S. Gov't experts, and experts abroad; by colleges and technical schools; and by professionals and amateurs everywhere.

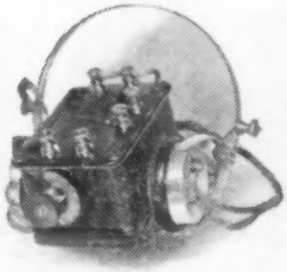
SEND 4c. FOR CATALOGUE F

C. BRANDES, Inc.

Room 821, 32 Union Square, New York

WIRELESS RECEIVER SPECIALISTS

MULTI-AUDI-FONE



THE PERFECT AMPLIFIER.

ONE STEP..... $18.00
TWO STEP..... $75.00

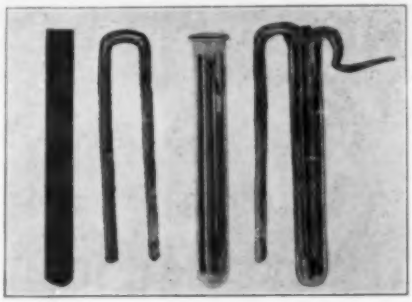
The Multi-Audi-Fone is an electro-chemical amplifier that increases damped or undamped signals many times their original audibility with any kind of detector.

The wonderful work that can be done with this instrument combined with its extreme low cost of up-keep (5c a month) makes it invaluable to the radio operator.

For sale at all "Modern" agencies.

Modern Radio Equipment Co.

27 So. Broad St., Elizabeth, N. J.



QST ANNOUNCEMENT QST

40 Volts of Plate Storage Battery and Charging Rectifier for $15.

The Hi-Volt Storage Battery has been increased from **24** to **40** volts and the **price remains the same.** The growing demand for higher voltages has caused this change. Our large increase in sales keeps the **price at $15.** Just QRX and think—**40 volts of high-grade storage battery and self-contained charging rectifier for $15.**

Will be sent Express Prepaid during Month of January.

We also sell the parts. Each complete cell, consisting of fully charged plates, container and separator (2 volts per cell) 40 cents each—not less than 10 cells sold.

Send 6c for Catalog Q—Battery Circular Free.

The C. D. Tuska Company

HARTFORD, CONNECTICUT

Vacuum Tube Hospital

IF YOU HAVE A BURNT OUT TUBE, DON'T THROW IT AWAY,
WE MAKE THEM AS GOOD AS NEW.

WE REPAIR THE FOLLOWING TUBES FOR $3.50

Marconi V.T., DeForest, Moorhead, Audiotron, Electron Relay.
Foreign Tubes Repaired, $7.00

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THE HEART OF THE WIRELESS

Fleming Pat. No. 803684
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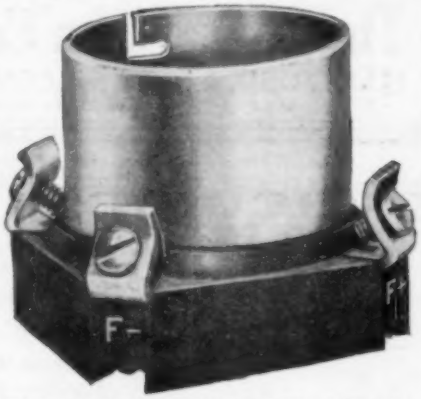
An Amateur Station Without a Vacuum Tube Is Years Behind the Times

MARCONI V.T.

$7.00 each

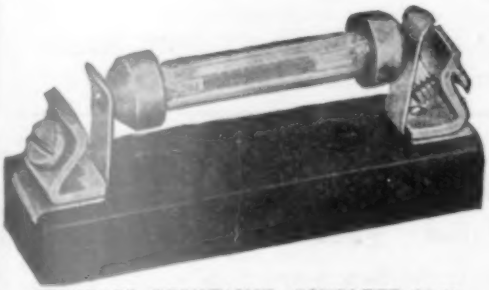
Under agreements recently effected the Marconi V. T. is the only vacuum tube, or audion, which may be sold to amateurs, laboratories, schools of instruction and experimenters.

THE APPROXIMATE OPERATING LIFE OF THE MARCONI V. T. IS 1,500 HOURS.



STANDARDIZED SOCKET $1.50 additional

FEDERAL AUDIO-FREQUENCY TRANSFORMER, DESIGNED FOR USE WITH THE MARCONI V.T., $7.10.



The Marconi Resistance, connected in the circuit between the grid and the filament of the Marconi V. T., is made in the following standard sizes:

½ megohm, 1 megohm, 4 megohms, 6 megohms.

Resistances of any special fractional values up to 6 megohms can be supplied.

STANDARD RESISTANCE, COMPLETE $1.00

Send all remittances with order to COMMERCIAL DEPARTMENT

Marconi Wireless Telegraph Company of America

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